ELEVENTH BIENNIAL REPORT

1936 1938

TMENT OF HIGHWAYS

TE OF NEVADA

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Eleventh Biennial Report
Department of Highways

Scene in Charleston Park, Clark County, an Increasingly Popular Recreational Center.

STATE OF NEVADA

ELEVENTH BIENNIAL REPORT

OF THE

DEPARTMENT OF HIGHWAYS

◆

For the Period
July 1, 1936, to June 30, 1938, Inclusive

CARSON CITY, NEVADA
STATE PRINTING OFFICE - - JOE FARNSWORTH, SUPERINTENDENT
1939

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Stanley D. Sundeen
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STATE HIGHWAY OFFICIALS

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Hon. Gray Mashburn, *Attorney-General*	Member Board of Directors
Hon. Henry C. Schmidt, *State Controller*	Member Board of Directors

HIGHWAY DEPARTMENT OFFICERS

Robert A. Allen	State Highway Engineer
H. D. Mills	Assistant State Highway Engineer
W. T. Holcomb, Assistant State Highway Engineer,	In Charge of Planning
Art Loforth, Assistant State Highway Engineer,	In Charge of Construction
A. Berning, Jr., Assistant State Highway Engineer,	In Charge of Field Personnel
E. C. Pohl	Auditor
E. W. Harris	Office Engineer
George R. Egan	Engineer of Design
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F. H. Morrison	Testing Engineer
B. C. Hartung	Manager Division of Safety and Accident Study
Frank Berger	Field Engineer
Dale B. Pruett	Right of Way Engineer
E. T. Boardman	Bridge Engineer
R. H. Sheehy	Maintenance Engineer
F. G. Greulich	Publicity Director
H. Swinburne	Landscape Architect
W. S. Holesworth	Equipment Superintendent
J. M. Murphy	Division Engineer, Division No. 1, Las Vegas
J. L. Hancock	Division Engineer, Division No. 2, Reno
F. H. Depp	Division Engineer, Division No. 3, Elko
C. C. Boyer	Division Engineer, Division No. 4, East Ely
J. D. Meacham	Division Engineer, Division No. 5, Tonopah
C. E. Wood	Division Engineer

LETTER OF TRANSMITTAL

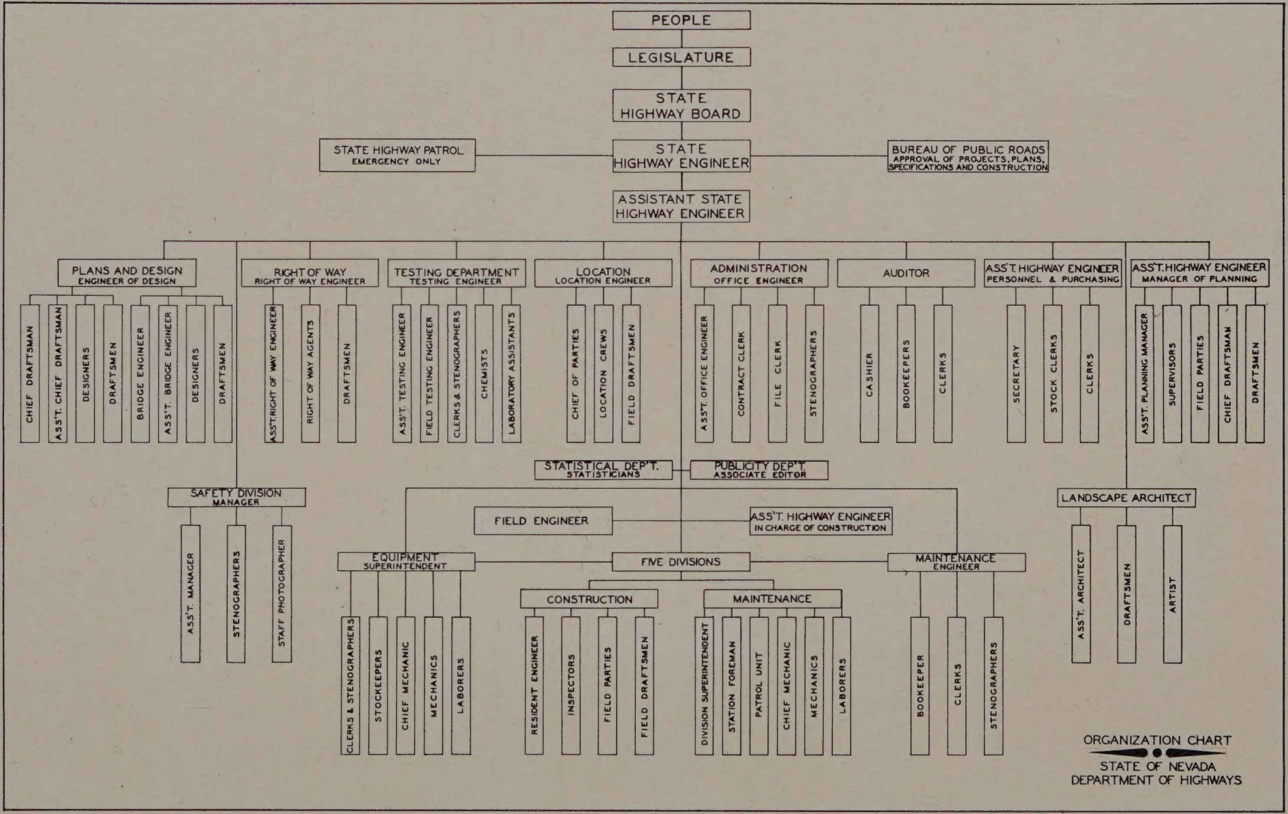
HONORABLE RICHARD KIRMAN, SR., *Governor of the State of Nevada,*
Carson City, Nevada.

DEAR GOVERNOR KIRMAN: The Department of Highways presents herewith its Eleventh Biennial Report, embracing the period July 1, 1936, to June 30, 1938.

This report sets forth the work of the Department during the biennium, and also outlines the proposed construction program for the next fiscal year.

Much credit is due to the United States Bureau of Public Roads, the County Commissioners, and the citizens of the State of Nevada for their splendid cooperation; to the employees of the Department for their sincerity and industry, and to yourself and the members of the Board for the valuable aid and encouragement given in conducting the business of this Department.

DEPARTMENT OF HIGHWAYS,
ROBERT A. ALLEN,
State Highway Engineer.



ORGANIZATION CHART

STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

RECOMMENDATIONS

By Robert A. Allen, *State Highway Engineer*

The State Highway Engineer herewith makes a number of recommendations and gives in tabulated form detailed statements of moneys received and payments made from the State Highway Fund.

This report likewise contains the proposed construction program for the fiscal year 1940, statistical data showing mileage and types of road constructed, number and types of structures built, status of the State Highway System at the close of the biennium, and maintenance costs, together with departmental activities and other information and data incident to the work carried on by the State Highway Department during the biennium.

The State Highway Engineer makes the following recommendations which he deems necessary for the best interests of the highway program in the State of Nevada:

We have reached a point where we now have approximately 2,700 miles of improved highway which must be maintained to a standard fixed by the Bureau of Public Roads and to which standard we have subscribed by contract with that bureau. Our gas tax, plate licenses, and common carrier tax revenues are hardly sufficient to carry on the activities of the department as to maintenance, construction, advertising the highway system, and the usual overhead incident to an organization of this kind. Any diversion of any part of these revenues would automatically cut us out of a very substantial part of our Federal aid money. In anticipation of the possibilities of such a move, this department, as you will remember, successfully sponsored an amendment to the Constitution at the last session of the Legislature. We now recommend and urge the submission of this same bill providing for a constitutional amendment preventing for all time the diversion of any revenues from these funds or any other special automobile tax away from highway use. With the successful passage in the next Legislature of such a bill, the matter can then go to the people for final action.

Because of the narrow margin between the receipts and expenditures from the Highway Fund in the past biennium it has become exceedingly difficult to find money with which to purchase the necessary rights of way for both new roads and betterments to our present road system. During the biennium it has become necessary, in many instances, for us to pass the purchase of rights of way, and those items for which we could not reclaim Federal funds, onto the counties. In the main the counties have responded in magnificent style. Without their help it would have been impossible to build many of the sections of our highway system which have been built in the past two years.

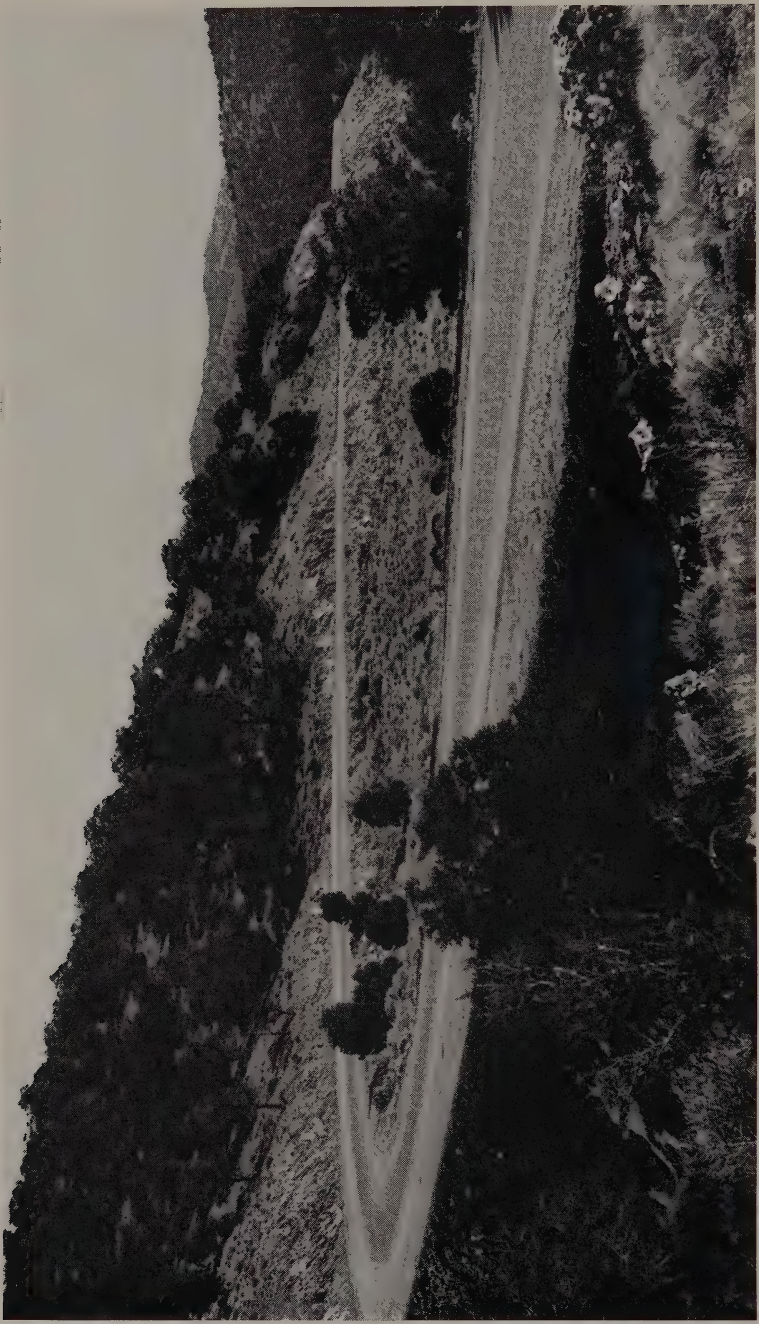
In order to correct this situation I recommend that a fund be established to be known as the Right of Way Acquisition Fund to be used solely for the purchase of rights of way. I recommend this feature because the rights of way upon which we utilize Federal funds to the

Left to Right—R. A. Allen, State Highway Engineer; Governor Richard Kirman, Sr., Chairman; Henry C. Schmidt and Gray Mashburn, Members of the Highway Board.

extent of 87% and 100% in some instances is a property right and should be recognized as a capital charge against all of the people of the State, and it would seem only fair that this special fund be created and replenished each year by taxation of all of our people. The legislation permitting this is already on the books, and it becomes merely a matter of taking care of this item in the budget.

During the biennium the department has successfully distributed its publication known as "Highways and Parks" in the interest of creating more traffic to and through our State. This publication has reached a distribution figure of such proportion as to warrant a special appropriation or a special tax on all of the people to continue it during the next biennium. I recommend, in view of the fact that the publication has drawn so many people into and through our State, and will continue to do so, that steps be taken to provide a special fund by direct tax on the people of the State who do benefit by the returns from the publication of this magazine.

The basic Highway Act provides among other things that suitable quarters will be provided by the State government for the use of the department. During the biennium we have found it necessary to utilize a large portion of the basement of the new Supreme Court Building and also practically all of the floor space in the Assembly Chamber as quarters for the planning survey and the drafting room. This department has designed a wing addition to the Heroes Memorial Building of suitable space to house all of these activities under one roof. We urgently recommend to you that provision be made by the next Legislature to finance the construction of this wing out of funds other than the State highway funds.



Showing a Stretch of U S 50, Near Eastgate, Churchill County, Presenting the Mountain Type of Nevada Highway Construction.

TENTATIVE HIGHWAY CONSTRUCTION

H. D. MILLS, *Assistant State Highway Engineer*

The highway construction program for the fiscal year 1940 will be curtailed to a considerable extent under the fiscal year 1939 program. This is caused by the very material reduction in Federal aid highway appropriations made by the last Congress. A comparison of Federal apportionments to Nevada for the fiscal years 1939 and 1940 is shown immediately below:

COMPARISON OF FEDERAL AID APPORTIONMENTS FOR FISCAL YEARS 1939 AND 1940

	1939	1940	Difference
Federal Aid highway system	$1,590,172	$1,275,047	—$315,125
Secondary or feeder roads	318,034	191,610	—126,424
Railroad grade crossings	243,750	97,500	—146,250
Federal lands highways	559,895	224,000	—335,895
Nevada forest highways	170,505	121,000	—49,505
Total	$2,882,356	$1,909,157	—$973,199

It should be explained here why the tentative program for expenditure of 1940 fiscal funds is shown instead of the year 1939. Both Federal and State fiscal years extend from July 1 to June 30. Federal highway funds may be programmed and placed under agreement on the first day of January preceding the beginning of the fiscal year. This procedure has been followed by the Highway Department; thus the funds for 1939 were programmed on January 1, 1938, the result being that these funds are practically depleted during the calendar year 1938. Tentative programs of projects to be constructed with fiscal year 1940 Federal funds (most of the projects to be under construction during the calendar year 1939) follow.

Only four of the funds shown in the table above are programmed herein, as the fund for forest highways is administered by the Bureau of Public Roads, the program of projects being recommended jointly by the Forest Service, the Bureau of Public Roads, and the State.

TENTATIVE PROGRAM OF PROJECTS TO BE CONSTRUCTED WITH FEDERAL AID (1940) FUNDS

Project	County	Termini	Length	Work proposed	Total cost	Federal Aid
112	Ormsby	Carson City to Ormsby-Lyon County line	5.66	Realign, widen, plantmix asphaltic surface	$140,000.00	$121,408.00
112	Ormsby	Carson City to Ormsby-Lyon County line	5.66	Roadside improvement	2,000.00	1,734.00
115–D	Lyon	Ormsby-Lyon County line to 2 miles east of Mound House	2.02	Realign, widen, plantmix asphaltic surface	50,000.00	43,360.00
115–D	Lyon	Ormsby-Lyon County line to 2 miles east of Mound House	2.02	Roadside improvement	300.00	260.00
89–C	Douglas	Topaz Junction to 3 miles north of Holbrook	4.48	Realign, widen, plantmix asphaltic surface	100,000.00	86,720.00
89–C	Douglas	Topaz Junction to 3 miles north of Holbrook	4.48	Roadside improvement	500.00	433.00
4	Douglas	3 miles north of Holbrook to 2 miles north of Carters	6.65	Realign, widen, plantmix asphaltic surface	160,000.00	138,752.00
4	Douglas	3 miles north of Holbrook to 2 miles north of Carters	6.65	Roadside improvement	1,500.00	1,300.00
118–A	Mineral	6 miles east of Basalt to 1½ miles east	4.50	Stabilize the base, construct 1½″ roadmix asph. wearing surface	36,000.00	31,219.00
22–A	Eureka	Shoshone overpass to Dunphy overpass	0.50	Construct new bridge and approaches Humboldt River	50,000.00	43,360.00
79–B	Pershing	Churchill-Pershing County line to 7 miles west of Lovelock	10.00	Realign, widen, temporary asphaltic surface (roadmix)	200,000.00	173,440.00
79–B	Pershing	Churchill-Pershing County line to 7 miles west of Lovelock	10.00	Roadside improvement	2,500.00	2,168.00
82–B	Humboldt	Winnemucca to Button Point	8.09	Realign, widen, temporary asphaltic surface (roadmix)	200,000.00	173,440.00
82–B	Humboldt	Winnemucca to Button Point	8.09	Roadside improvement	2,000.00	1,734.00
15	Elko	Eureka-Elko County line to Vivian	7.16	Realign, widen, plantmix asphaltic surface	200,000.00	173,440.00
15	Elko	Eureka-Elko County line to Vivian	7.16	Roadside improvement	2,500.00	2,168.00
5	Elko	Vivian to 1.69 miles east	1.69	Realign, widen, plantmix asphaltic surface	45,000.00	39,024.00
5	Elko	Vivian to 1.69 miles east	1.69	Roadside improvement	500.00	433.00
43–A	Clark	1 mile west of Glendale to west slope of Mormon Mesa	6.00	Realign, widen, temporary roadmix asphaltic surface	168,000.00	145,680.00
43–A	Clark	1 mile west of Glendale to west slope of Mormon Mesa	6.00	Roadside improvement	2,000.00	1,734.00
53–A	Clark	East slope Mormon Mesa to Riverside	3.00	Realign, widen, temporary roadmix asphaltic surface	85,000.00	73,712.00
53–A	Clark	East slope Mormon Mesa to Riverside	3.00	Roadside improvement	500.00	433.00
910		State-wide rural planning			22,050.00	19,095.00
		Total			$1,470,350.00	$1,275,047.00

TENTATIVE PROGRAM OF PROJECTS TO BE CONSTRUCTED WITH FEDERAL AID SECONDARY (1940) FUNDS

Project	County	Termini	Length	Work proposed	Total cost	Federal Aid
	Churchill	2½ miles southwest of Fallon to 4½ miles southwest—Sheckler District	2.00	Grade, gravel, roadmix asphaltic surface	$25,000.00	$21,680.00
	Pershing	Lovelock to 2 miles toward cemetery northwest	2.00	Grade, gravel, roadmix asphaltic surface	20,000.00	17,340.00
FAS 134–C	Elko	Portions between 2 miles north of Dinner Station and 10½ miles north	2.75	Stabilize the base, add, gravel, roadmix asph. surface	17,000.00	14,740.00
FAS 134–D	Elko	Portions between 10¼ miles north of Dinner Station and 5 miles south of North Fork	7.00	Stabilize the base, add, gravel, roadmix asph. surface	45,000.00	39,020.00
FAS 2–B	Humboldt	10 miles north Junction Route 8 to Paradise Valley	7.90	Roadmix asphaltic surface	22,000.00	19,070.00
	Washoe	Junction Asylum road east to junction Glendale road	2.00	Grade, gravel, roadmix asphaltic surface	22,000.00	19,070.00
FAS 6–B	Eureka	South end of FAS Project 6–A to Beowawe	0.50	Construct bridge over Humboldt River and approaches	20,000.00	17,340.00
910		State-wide rural planning			3,310.00	2,870.00

PROJECTS ON STATE HIGHWAY SYSTEM

Project	County	Termini	Length	Work proposed	Total cost	Federal Aid
FAS 134–A	Elko	Portions between 10.8 miles north of Elko and 15.4 miles north	2.70	Roadmix asphaltic surface	$7,000.00	$6,070.00
FAS 134–B	Elko	Portions between 15.4 miles north of Elko and 2 miles north of Dinner Station	5.45	Roadmix asphaltic surface	14,000.00	12,140.00
FAS 131–E	Lyon	Portions between Fernley Junction and 6 miles south of Fernley	3.84	Grade, install structures, gravel	25,690.00	22,270.00
		Total			$221,000.00	$191,610.00

TENTATIVE PROGRAM OF PROJECTS TO BE CONSTRUCTED WITH FEDERAL AID GRADE CROSSING (1940) FUNDS

County	Project	Location of project	Character of work	No. of grade crossings eliminated	Total cost	Grade crossing funds requested
Elko	Southern Pacific Company FAGH 75—Route F.A. 1	Vicinity of Deeth	Widen existing overpass	None	$35,000.00	$35,000.00
Clark	Los Angeles and Salt Lake Railroad FAGH 43–A—Route F.A. 5	Vicinity of Glendale	Construct overpass of Logandale branch of Los Angeles and Salt Lake Railroad	One	35,000.00	35,000.00
	Various Railroads—Install automatic grade crossing signals at locations to be determined from information obtained by Rural Planning Survey				27,500.00	27,500.00
	Total				$97,500.00	$97,500.00

TENTATIVE PROGRAM OF PROJECTS TO BE CONSTRUCTED WITH FEDERAL LANDS (1940) FUNDS

County	Termini	Length	Work proposed	Estimate of cost
Elko	Portions between 10.8 miles north of Elko and 15.4 miles north	1.92	Roadmix asphaltic surface	$5,000.00
Elko	Portions between 15.4 miles north of Elko and 2 miles north of Dinner Station	4.62	Roadmix asphaltic surface	12,000.00
Elko	Portions between 2 miles north of Dinner Station and 10.25 miles north	5.51	Add gravel, roadmix asphaltic surface	27,000.00
Elko	Portions between 10¼ miles north of Dinner Station and 5 miles south of North Fork	5.00	Add gravel, roadmix asphaltic surface	18,000.00
Lyon	Portions between Fernley Junction and 6 miles south of Fernley	4.59	Grade, install structures, gravel	32,000.00
Lander	20 miles south of Battle Mountain to 40 miles south	20.00	Grade, install structures, gravel	130,000.00
	Total			$224,000.00

Showing a Stretch of Nevada Route 3 Near Tonopah.

A Three-Wheel Tandem Used in Smoothing the Surface of U S 395, Near Minden and Gardnerville.

Showing a Stretch of U S 40 West of Reno After Reconstruction.

CONSTRUCTION

ART LOFORTH, *Construction Engineer*

For the biennium ending June 30, 1938, Federal funds in the amount of $4,363,041 were allocated for construction of highways, bridges, grade separation structures, grade crossing signals, and for highway planning.

A segregation of the funds for each year of the biennium follows:

FISCAL YEAR 1937		
Regular Federal aid		$1,593,978
FISCAL YEAR 1938		
Regular Federal aid	$1,632,385	
Feeder roads	326,477	
Grade crossing structures	250,000	
Highways through public lands	560,201	
		2,769,063
Grand total for biennium		$4,363,041

In the tables that follow will be found complete statistical data showing construction during the biennium, and status of the State highway system at the close of the biennium.

CONTRACTS AWARDED BY STATE, JULY 1, 1936, TO JUNE 30, 1937

Contract No.	County	Length in miles	Type of construction	Termini
483	Washoe, Lyon, Storey	13.229	Roadmix	Junction Route No. 3 near Browns to Virginia City, and Virginia City to Silver City
484	Elko	10.801	Roadmix	Elko to approximately 11 miles north
485	Washoe	2.728	Roadmix	California-Nevada State line to 3 miles north
486	Clark	0.178	Concrete and Steel	Underpass on Clark Avenue in Las Vegas
487	Douglas	6.690	Plantmix	Minden to Cradelbaugh
488	Nye	8.897	Gravel	East Boundary Nevada National Forest to 9 miles east
489	Humboldt	0.263	Grading	Within the city of Winnemucca
490	Churchill	2.379	Gravel	450 feet south of north city limits of Fallon to 2.4 miles north
491	Nye	5.010	Gravel	Junction Route No. 4 to 5.01 miles north
492A	Humboldt	0.658	Roadmix	Third and Melarkey Streets, Winnemucca
492B	Humboldt	0.060	Roadmix	Giroux Street, Winnemucca
493	Washoe	0.026	Concrete and Steel	Sierra Street bridge, Reno
494	Washoe	0.029	Concrete and Steel	Lake Street bridge, Reno
495	Lincoln	14.322	Gravel	½ mile north of Caliente to 1 mile north of Panaca Junction
496	Clark	11.600	Plantmix	Las Vegas to 3 miles southwest of Apex
497	Esmeralda	10.681	Gravel	10 miles south of Blair Junction to Silver Peak
498	Elko	16.975	Plantmix	1.6 miles east of Vivian to Elko
499	White Pine-Elko	79.060	Roadmix	Junction Route No. 24 to Wells
500	Nye	38.705	Roadmix	East Boundary Nevada National Forest to 9 miles east and 22 miles west of Lockes to 7.24 miles east of Lockes
501	Lincoln	30.067	Roadmix	Crystal Springs to 14 miles west of Caliente
502	Lincoln	15.733	Roadmix	Stonehouse to Pony Springs—Lovelock to 5 miles south and 6 miles east of Fallon to Stillwater
503	Pershing, Churchill, Douglas	24.568	Roadmix	Fallon to 3 miles north, Junction 3 to Genoa, Centerville to Gardnerville

CONTRACTS AWARDED BY STATE, JULY 1, 1937, TO JUNE 30, 1938

Contract No.	County	Length in miles	Type of construction	Termini
504	Churchill	14.032	Roadmix	Lyon-Churchill County line to 14 miles east
505	Humboldt	7.118	Plantmix	5 miles west of Winnemucca to and through Winnemucca
506	Lincoln	14.323	Roadmix	½ mile north of Caliente to 1 mile north of Panaca Junction
507	Storey	4.956	Gravel	½ mile north of Virginia City to 5 miles northwest
508	Douglas	1.800	Retread	Gardnerville to Minden
509	Elko	1.294	Roadmix	Concrete and steel overpass and approaches at Wells
510	Elko	8.253	Gravel	2 miles north Dinner Station to 10.25 miles north
511	Ormsby	0.840	Prime Coat	Nevada State Prison to 0.9 miles east
512	Nye	9.240	Gravel	9 miles east of E. Boundary of Nevada National Forest to Warm Springs
513	Lincoln	14.960	Gravel	Pony Springs to 5.4 miles north
514	Nye	7.740	Gravel	5 miles north Junction 4 and 8–A to 12.7 miles north
515	Lincoln	10.104	Gravel	5.4 miles north of Dutch John's to Lincoln-White Pine County line
516	Clark	1.700	Roadmix	Junction Route No. 6 and 7 to 1.7 miles northwest on Route No. 7
517	White Pine	29.327	Gravel	Lincoln-White Pine County line to 2.35 miles northwest of east foot of Connor's Pass
518	Humboldt	10.035	Gravel	Junction Route No. 8 and 8–B (Paradise Hill) to 10 miles northeast on Route 8–B
519	Clark	1.078	Roadmix	Concrete and steel underpass and approaches at Las Vegas
520	Lyon	4.096	Gravel	8.5 miles north of Wabuska to Weeks
521	Pershing	2.041	Roadmix	North of Lovelock city limits to 2 miles north
522	Eureka	0.792	Roadmix	Concrete and steel overpass and approaches at Shoshone
523	Washoe	1.698	Roadmix	Junction State Route No. 3 to 2 miles west (Mount Rose Road)
524	Clark	7.335	Grade and Drain	Jean to Goodsprings
525	Nye	8.837	Grade and Drain	East Boundary Death Valley National Monument to Beatty
526	Churchill	3.040	Roadmix	½ mile south of Fallon to 2 miles southwest (Scheckler Lane)
527	Eureka	4.618	Gravel	Junction Route 1, 5.7 miles east Dunphy to 0.82 miles north Beowawe
528	White Pine	4.714	Roadmix	Keystone to Ely
529	Douglas	0.019	Concrete and Steel	Reconstruct bridge 1 mile south of Gardnerville
530	Washoe		Roadmix Shoulders	Retaining wall at Chalk Bluff-Lawtons to Reno
531	Elko		Drainage	5 miles north of Currie to 26 miles south of Wells
532	Nye	12.749	Gravel	West Boundary to East Boundary Nevada National Forest
533	Clark	7.335	Roadmix	Jean to Goodsprings
534	Nye	9.241	Roadmix	9 miles east of East Boundary Nevada National Forest to 2 miles west of Warm Springs
535	Churchill	13.705	Roadmix	13¾ miles west of County line to Churchill-Pershing County line
536	Nye	8.837	Roadmix	East Boundary Death Valley National Monument to Beatty
537	Lyon	8.004	Gravel	Weeks to Fernley Junction
538	Esmeralda	10.681	Roadmix	10 miles south of Blair Junction to Silver Peak
539	White Pine		Wigwag Signals	Grade crossing signals at Ely Cemetery crossing of N. N. R. R.
540	Nye	24.118	Gravel	12¾ miles north of Junction of State Routes No. 4 and 8–A to a point opposite Manhattan
541	Nye	12.744	Roadmix	Junction of State Routes No. 4 and 8–A to a point 12¾ miles north
542	Clark	20.397	Roadmix	Railroad Pass to a point approximately 20 miles south
543	Elko	12.050	Gravel	10 miles north of Dinner Station to approximately 5 miles south of North Fork
544	White Pine	26.971	Roadmix	Lincoln-White Pine County line to east foot of Connor's Pass
545	Lincoln	25.065	Roadmix	Pony Springs to Lincoln-White Pine County line
546	Washoe	22.496	Roadmix	10 miles north of Reno to Pyramid Lake

Construction Work on Fernley Bridge, Continued in Spite of a Flooding Carson River.

A Stretch of Desert Road Crossing Nevada's Wide-Open Spaces.

DAY LABOR CONSTRUCTION PROJECTS, JULY 1, 1936, TO JUNE 30, 1938

Day labor Proj. No.	County	Mileage	Type of construction	Location
99	White Pine	0.88	Roadmix asphaltic surface	Mill Street in city of Ely
100	Washoe	0.86	Curbs and gutters, grading and paving	11th Street in city of Reno to junction State Route No. 9
101	Elko		Construction right of way fence	Between a point approximately 13 miles east of Elko and North Fork bridge
102	Elko	0.98	Roadmix asphaltic surface	Within city of Elko
104	Washoe, Clark and Elko		Installing pit scales (3)	Located as follows: Reno, Las Vegas, and Wells
106	Washoe	0.25	Improve South Plumas Street	Reno
107	Nye		Structures only	5 miles north junction Route No. 4 to Manhattan
108	Esmeralda	16.50	Construction of a new road	16 miles south Goldfield on Route No. 5, westwardly to approximately 2 miles east of mouth of Lida Canyon
110	Washoe	0.56	Grade, surface, construct curbs, gutters	West Second Street, Reno
111	Washoe		Excavating roadway, asphaltic materials, traffic stripe	City of Reno
112	Washoe	6.00	Construction of cotton membrane, bituminous road	Wedekind Mine to 4 miles north
113	Ormsby	0.17	Roadmix asphaltic surface, curbs, gutters	Carson City
114	Douglas		Flattening slopes, constructing surface ditch	On highway near south State line, Lake Tahoe
115	Lander		R C 2 asphaltic seal	Austin Cemetery and east slope Austin Summit
116	Nye		Installing culvert, extending drainage ditch	Vicinity Cinder Cones Stations
117	Elko		Plantmix asphaltic material	Idaho Street, city of Elko
121	Elko		Grading and graveling	Dinner Station to Johnson Ranch
122	Douglas		Change in grade of gutter	Town of Gardnerville
123	Nye		Constructing road	Northerly end of Contract 514, Nye 8A–A1 to connect with present county road to Belmont
124	Elko		Construction of rock wall	Station No. 163 to Station No. 172, approximately
125	Douglas		Construction of bridge	½ mile south of Gardnerville
127	Nye		Construction of ditch and dike	In the town of Beatty
128	Lyon		Roadmix asphaltic surface	Junction with oil highway through Silver City to Lyon-Storey County line
129	Washoe		Installing automatic flashing signals	Near Panther Siding, Washoe County
130	Elko		Installing automatic flashing signals	At Elko
132	Mineral		Construction of Luning to Brucite road	Luning to 14.7 miles northeast toward Brucite
133	Lyon		Raising height of fill 2 feet across flat	Wabuska to Thompson
134	Ormsby		Construction right of way fence	Carson City to Mound House

DAY LABOR ROADSIDE IMPROVEMENT PROJECTS, JULY 1, 1936, TO JUNE 30, 1938

Day labor Proj. No.	County	Mileage	Type of construction	Location
103	Pershing		Roadside improvement	Lovelock to Kodak
105	Washoe		Landscaping Wells-Alameda underpass	Alameda underpass, Reno
109	Esmeralda		Rental of equipment to be used by Esmeralda County	Gold Point Road, Esmeralda County
118	Pershing		Replacing trees	Lovelock to 4 miles east
119	Churchill		Replacing trees	Fallon to 5 miles south
120	Ormsby, Washoe		Replacing trees	Carson to Washoe Summit
126	Humboldt		Roadside improvement	South city limits Winnemucca to Third and Hurst Streets
131	Washoe		Roadside improvement	Geiger Grade Lookout

North Sierra Street, a Feeder Road Forming an Alternate U S 395 Route into Reno.

Heavy Construction was Required in Carlin Canyon, in Elko County, on U. S. Route 40.

TABLE SHOWING PROGRESS STATUS OF THE FEDERAL AID HIGHWAY SYSTEM, STATE HIGHWAYS NOT ON FEDERAL AID SYSTEM, AND ENTIRE STATE HIGHWAY SYSTEM AS OF JUNE 30, 1936, THE CLOSE OF THE BIENNIUM

	Federal Aid System			Remaining State Highway System			Entire State Highway System		
Counties	Completed	Unimproved	Totals	Completed	Unimproved	Totals	Completed	Unimproved	Totals
Churchill	126.06	....	126.06	26.01	58.00	84.01	152.07	58.00	210.07
Clark	140.17	....	140.17	127.96	233.18	361.14	268.13	233.18	501.31
Douglas	56.60	....	56.60	12.51	13.00	25.51	69.11	13.00	82.11
Elko	333.68	....	333.68	....	373.00	373.00	333.68	373.00	706.68
Esmeralda	97.62	....	97.62	18.68	91.31	109.99	116.30	91.31	207.61
Eureka	72.09	....	72.09	....	179.00	179.00	72.09	179.00	251.09
Humboldt	133.18	....	133.18	....	225.00	225.00	133.18	225.00	358.18
Lander	108.09	....	108.09	15.62	187.48	203.10	123.71	187.48	311.19
Lincoln	79.54	....	79.54	91.38	78.10	169.48	170.92	78.10	249.02
Lyon	108.13	....	108.13	49.53	47.49	97.02	157.66	47.49	205.15
Mineral	109.11	21.88	130.99	10.26	73.00	83.26	119.37	94.88	214.25
Nye	2.88	....	2.88	269.54	254.62	524.16	272.42	254.62	527.04
Ormsby	20.66	....	20.66	4.95	....	4.95	25.61	....	25.61
Pershing	74.98	....	74.98	....	192.00	192.00	74.98	192.00	266.98
Storey	9.44	....	9.44	....	10.00	10.00	9.44	10.00	19.44
Washoe	96.35	....	96.35	66.94	231.01	297.95	163.29	231.01	394.30
White Pine	192.02	....	192.02	62.38	105.00	167.38	254.40	105.00	359.40
Totals	1,760.56	21.88	1,782.44	761.96	2,351.19	3,113.15	2,516.36	2,373.07	4,889.43

TABLE SHOWING PROGRESS STATUS OF THE FEDERAL AID HIGHWAY SYSTEM, STATE HIGHWAYS NOT ON FEDERAL AID SYSTEM, AND ENTIRE STATE HIGHWAY SYSTEM AS OF JUNE 30, 1938, THE CLOSE OF THE BIENNIUM

	Federal Aid System			Remaining State Highway System			Entire State Highway System		
Counties	Completed	Unimproved	Totals	Completed	Unimproved	Totals	Completed	Unimproved	Totals
Churchill	125.89	....	125.89	28.39	53.90	82.29	154.28	53.90	208.18
Clark	140.00	....	140.00	160.05	174.25	334.30	300.05	174.25	474.30
Douglas	60.04	....	60.04	16.59	12.30	28.89	76.63	12.30	88.93
Elko	333.43	....	333.43	34.82	380.65	415.47	368.25	380.65	748.90
Esmeralda	97.22	....	97.22	58.18	57.45	115.63	155.40	57.45	212.85
Eureka	72.01	....	72.01	5.65	186.85	192.50	77.66	186.85	264.51
Humboldt	133.10	....	133.10	18.00	218.55	236.55	151.10	218.55	369.65
Lander	108.09	....	108.09	20.00	175.35	195.35	128.09	175.35	303.44
Lincoln	79.18	....	79.18	119.45	105.10	224.55	198.63	105.10	303.73
Lyon	108.16	....	108.16	49.50	68.25	117.75	157.66	68.25	225.91
Mineral	109.10	21.88	130.98	10.51	76.85	87.36	119.61	98.73	218.34
Nye	32.93	....	32.93	245.98	339.26	585.24	278.91	339.26	618.17
Ormsby	20.66	....	20.66	4.95	....	4.95	25.61	....	25.61
Pershing	74.98	....	74.98	5.27	173.20	178.47	80.25	173.20	253.45
Storey	9.38	....	9.38	....	14.05	14.05	9.38	14.05	23.43
Washoe	96.84	....	96.84	68.66	227.20	295.86	165.50	227.20	392.70
White Pine	191.01	....	191.01	58.64	128.90	187.54	249.65	128.90	378.55
Totals	1,792.02	21.88	1,813.90	904.64	2,392.11	3,296.75	2,696.66	2,413.99	5,110.65

NEVADA FOREST HIGHWAY SYSTEM IN NEVADA

Revised as of January 1, 1938

Route No.	Name	Termini	Forest	Approx. length
1	Lake Tahoe	Spooners north to California State line	Tahoe	15.7
2	Mount Rose (Incline)	Incline to Reno Hot Springs	Tahoe	23.1
3	Glenbrook (U S 50)	California State line north to Spooners	Tahoe	12.8
4	Carson Canyon	Minden junction to California State line	Mono	7.9
5	Topaz (U S 395)	Holbrook junction to California State line	Mono	3.5
6	Dalzell Canyon	Wellington to California State line	Mono	32.0
7	Austin, east and west (U S 50)	Railroad Pass to east line forest boundary extended	Nevada	65.3
8	Big Smoky Valley	Austin-Eureka road to southeast forest boundary	Nevada	75.0
9	Manhattan-Belmont	Manhattan to Belmont	Nevada	21.0
10	Midland Trail (Tonopah Road)	West forest boundary to end of Bureau Public Roads survey	Nevada	18.6
11	Mt. Charleston Road	East forest boundary to Mt. Charleston	Dixie	3.7
12	Midland Trail (Currant Creek)	Butler's Ranch to approx. 2 miles south of White River bridge	Nevada	18.4
13	Midland Trail	Ely to Holt Creek	Nevada	12.0
14	Grand Central (U S 93)	Ely to Spring Valley Road (Connor's Pass)	Nevada	26.6
15	Ruby Valley (Secret Pass)	West Valley road to forks on east	Humboldt	9.0
16	Kingsbury	U S 50 to Minden Junction	Tahoe	15.5
18	Owyhee River	Western Shoshone Indian Reservation to S. forest boundary, ext'd	Humboldt	47.8
20	Lehman Caves	Ely-Milford road to camp ground, plus 1 mile spur	Humboldt	10.0
Total length				417.9

CONTRACTS AWARDED FOR FOREST HIGHWAY CONSTRUCTION, JULY 1, 1936, TO JUNE 30, 1938

County	National Forest	Mileage	Type of construction	Location	Approximate cost to date
Elko	Humboldt	7.554	Grading	Mountain City highway	$190,546
Elko	Humboldt	2.578	Grading	Mountain City highway	50,203

FOREST HIGHWAY FUND APPORTIONMENTS TO NEVADA

1922	$55,352.00
1923	152,632.00
1924	75,915.00
1925	75,799.00
1926	97,249.00
1927	96,939.00
1928	96,603.00
1929	93,867.00
1930	94,463.00
1931	187,058.00
1932	187,008.00
1933	319,204.00
1934	312,310.00
1935	132,492.00
1936	131,537.00
1937	128,935.00
1938	171,272.00
1939	170,505.00

STATUS OF MILEAGE ON STATE HIGHWAY SYSTEM BY TYPES

Type	As of June 30, 1936	As of June 30, 1938
Unimproved	2,373.07	*2,413.99
Graded and drained	73.44	34.31
Total nonsurfaced	2,446.51	2,448.30
Crushed gravel or stone base	477.72	271.08
Roadmix asphalt	1,811.64	2,198.82
Emulsified asphaltic retread	2.82	3.76
Plantmix	89.01	130.27
Asphaltic concrete	35.30	40.16
Portland cement concrete	23.42	13.99
Miscellaneous	3.01	4.27
Total surfaced	2,442.92	2,662.35
Grand total	4,889.43	†5,110.65

*Mileage corrected from final figures by State-Wide Planning Survey.
†165.41 miles added to State Highway System by legislative enactment in 1937.

MILES OF HIGHWAY CONSTRUCTED DURING BIENNIUM, AND MILES OF HIGHWAY UNDER CONSTRUCTION AT CLOSE OF BIENNIUM ON STATE HIGHWAY SYSTEM

Type	Miles completed during biennium July 1, 1936, to June 30, 1938	Miles under construction at close of biennium June 30, 1938	Total miles
Crushed gravel	68.36	56.92	125.28
Roadmix asphalt	413.34	136.51	*549.85
Plantmix asphalt	42.39	....	42.39
Asphaltic concrete	4.86	....	4.86
Retread	1.80	....	1.80
	530.75	193.43	724.18

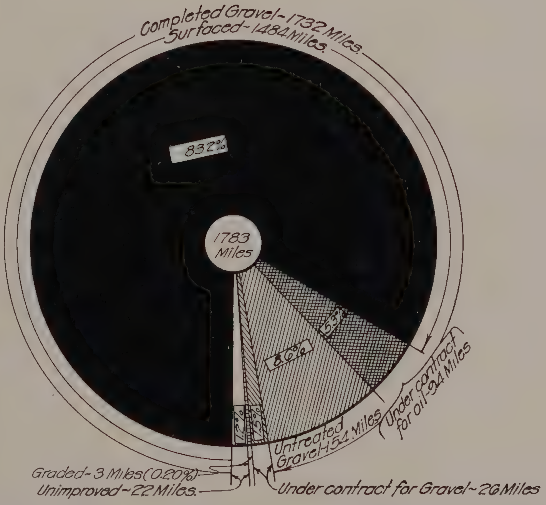
*Includes 263.58 miles oiling only.

General Note—No duplicate mileage shown in this chart, *e. g.* graveled mileage subsequently oiled during biennium is listed as roadmix asphalt and not as gravel.

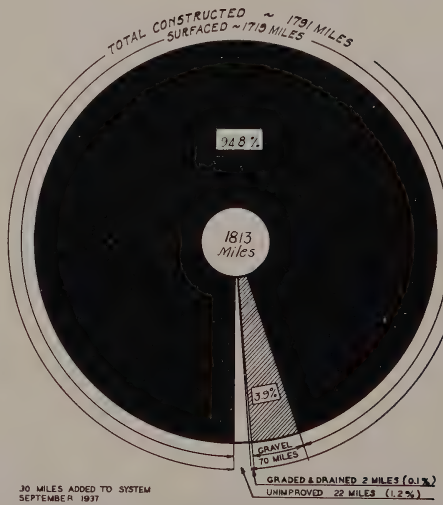
MILES OF HIGHWAY CONSTRUCTED DURING BIENNIUM, AND MILES UNDER CONSTRUCTION AT CLOSE OF BIENNIUM NOT INCLUDED IN STATE HIGHWAY SYSTEM

Type	Miles completed during biennium July 1, 1936, to June 30, 1938	Miles under construction at close of biennium June 30, 1938	Total miles
Roadmix asphalt	23.73	0	*23.73

*Includes 7.99 miles oiling only.

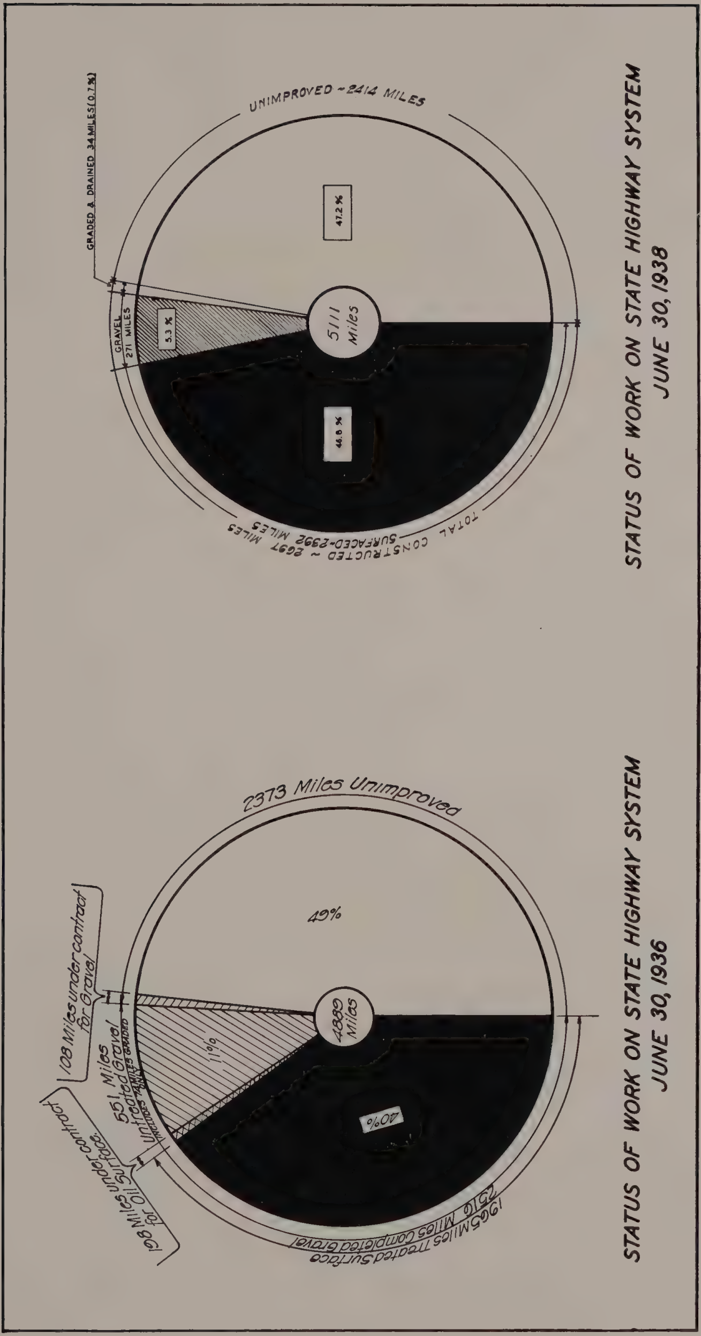


STATUS OF WORK ON FEDERAL AID HIGHWAY SYSTEM
JUNE 30, 1936



NOTE 30 MILES ADDED TO SYSTEM SEPTEMBER 1937

STATUS OF WORK ON FEDERAL AID HIGHWAY SYSTEM
JUNE 30, 1938



STATUS OF WORK ON STATE HIGHWAY SYSTEM
JUNE 30, 1938

STATUS OF WORK ON STATE HIGHWAY SYSTEM
JUNE 30, 1936

FEDERAL AID HIGHWAY SYSTEM IN NEVADA

The total mileage on the Federal Aid Highway System in Nevada is 1,781.77, derived as follows:

Estimated total mileage in State at passage of amended Federal Aid Highway Act in 1921 was 22,000.	
Original allotted mileage of Federal Aid System by Federal Aid of 1921* (7% of 22,000)	1,540
Additional 1% added by virtue of completion of original 7% system† (1% of 22,000)	220
Additional mileage through reservations allowed by section 3 of amendment dated May 21, 1928‡	21.77
Total allowable mileage of Federal Aid System as of June 30, 1936	1,781.77

SUMMARY

Mileage of Nevada Federal Aid Highway System

F. A. Route No.	Mileage
1	418.469
2	421.688
3	306.620
3 (Spur addition)	3.459
4	75.730
5	128.202
6	73.929
7	118.250
8	22.237
9	67.733
10	78.883
11	11.710
12	34.170
13	22.332
14	30.026
Total	1,813.438

Additional mileage allowed by section 3 of Act approved May 1, 1928, as revised and approved by Secretary, September 17, 1937:

Pyramid Lake Indian Reservation	2.4
Walker Lake Indian Reservation	24.60
Nevada National Forest	27.255
Total	54.255
Mileage allowed in Federal Aid System	1,760.000
Total	1,814.3
Total eligible mileage in approved routes	1,813.438
Balance available for new mileage	0.862

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*Before any projects are approved in any State, such State, through its State highway department, shall select or designate a system of highways not to exceed 7 percentum of the total highway mileage of such State as shown by the records of the State highway department at the time of the passage of this Act.

†Whenever provision has been made by any State for the completion and maintenance of a system of primary or interstate and secondary or intercounty highways equal to 7 percentum of the total mileage of such State, as required by this Act, said State, through its State highway department, by and with the approval of the Secretary of Agriculture, is hereby authorized to add to the mileage of primary or interstate and secondary or intercounty systems as funds become available for the construction and maintenance of such additional mileage.

—Excerpts from section 6 of the amended Federal Highway Act of 1921.

‡The system of Federal aid highways on which Federal funds may be expended in any State may exceed 7 percentum of the total highway mileage of such State by the mileage of roads on said system within National Forest, Indian, or other Federal reservations therein.

—Excerpt from section 3 of amendment dated May 21, 1928, to Federal Aid Highway Act of 1921.

REVISED LOG—FEDERAL AID HIGHWAY SYSTEM, AS OF JUNE 30, 1938

FEDERAL AID ROUTE NO. 1

F. A. Project	Termini	Type	Length, miles
73–B	California-Nevada State line to 2 miles east Verdi	Portland Cement Concrete	5.699
73–A	2 miles east Verdi to Lawtons	Portland Cement Concrete	2.914
73–A	2 miles east Verdi to Lawtons	Asphaltic Concrete	0.873
26	Lawtons to Reno (west city limits)	Asphaltic Concrete	4.106
26	Fourth Street, Reno (west city limits to Virginia Street)	Asphaltic Concrete	0.683
21	Fourth Street, Reno (Virginia Street to east city limits)	Asphaltic Concrete	0.848
21	Fourth Street, Reno (Virginia Street to east city limits)	Emulsified Asphaltic Retread	0.516
21	East Reno city limits to west Sparks city limits	Asphaltic Concrete	0.466
48	Sparks (west to east city limits)	Asphaltic Concrete	2.006
65–B	Sparks to Vista	Roadmix Asphalt	2.540
65–A	Vista to Hafed	Plantmix Asphalt	5.262
98–A	Hafed to Clark	Plantmix Asphalt	8.234
98–B	Clark to 0.69 mile west Derby	Plantmix Asphalt	6.454
98–C	0.69 mile west Derby to Derby	Plantmix Asphalt	0.691
84–A	Derby to Wadsworth bridge	Plantmix Asphalt	5.297
84–B	Wadsworth bridge and approaches	Plantmix Asphalt	0.737
84–A	Wadsworth bridge to Washoe-Lyon County line	Plantmix Asphalt	0.150
84–A	Washoe-Lyon County line to Fernley	Plantmix Asphalt	2.262
66–B	Fernley to Junction Route No. 2	Plantmix Asphalt	0.970
79–C	Fernley overhead and approaches	Plantmix Asphalt	0.333
79–A	Fernley Junction Route No. 2 to Lyon-Churchill County line	Plantmix Asphalt	4.147
79–A	Fernley Junction Route No. 2 to Lyon-Churchill County line	Roadmix Asphalt	8.546
79–A	Lyon-Churchill County line to Fanning	Roadmix Asphalt	26.738
79–B	Fanning to Churchill-Pershing County line	Roadmix Asphalt	1.020
79–B	Churchill-Pershing County line to Lovelock	Roadmix Asphalt	16.732
79–D	Through Lovelock	Portland Cement Concrete	1.096
79–D	Through Lovelock	Roadmix Asphalt	0.125
1	Lovelock to Zola	Roadmix Asphalt	16.645
19	Zola to Mill City	Roadmix Asphalt	26.692
91	Mill City to Pershing-Humboldt County line	Roadmix Asphalt	13.688
58–A	Pershing-Humboldt County line to Winnemucca	Roadmix Asphalt	7.392
58–A	Pershing-Humboldt County line to Winnemucca	Plantmix Asphalt	5.525
58–B	Rose Creek overpass	Roadmix Asphalt	0.208
76–A	Winnemucca (south city limits to Third and Hurst Streets)	Plantmix Asphalt	0.628
76–A	Winnemucca (south city limits to Third and Hurst Streets)	Portland Cement Concrete and Plantmix	0.776
76–B	Winnemucca (Third and Hurst Streets to east city limits)	Roadmix Asphalt	0.971
82–B	Winnemucca to Golconda	Roadmix Asphalt	17.782
82–A	Golconda to 8½ miles east	Roadmix Asphalt	8.447
82–B	8½ miles east Golconda to Stonehouse	Roadmix Asphalt	6.573
47	Stonehouse to 1.7 miles west of Valmy	Roadmix Asphalt	3.330
32	1.7 miles west Valmy to Humboldt-Lander County line	Roadmix Asphalt	7.510
16	Humboldt-Lander County line to Battle Mountain	Roadmix Asphalt	8.520
92–A	Through Battle Mountain	Portland Cement Concrete	0.307
92–A	Battle Mountain to Lander-Eureka County line	Roadmix Asphalt	19.664
22–A	Lander-Eureka County line to Dunphy	Roadmix Asphalt	4.381
22–B	Shoshone overpass and approaches	Roadmix Asphalt	0.497

FEDERAL AID HIGHWAY SYSTEM—*Continued*

F. A. Project	Termini	Type	Length, miles
92–C	Dunphy to 12 miles east	Roadmix Asphalt	11.946
92–D	12 miles east Dunphy to Eureka-Elko County line	Roadmix Asphalt	9.930
15	Eureka-Elko County line to Vivian	Roadmix Asphalt	7.163
5	Vivian to Elko	Plantmix Asphalt	18.584
81	Elko (west city limits to Thirteenth Street)	Portland Cement Concrete	1.925
18	Elko (Thirteenth Street) to Halleck	Portland Cement Concrete	0.082
18	Elko (Thirteenth Street) to Halleck	Roadmix Asphalt	19.651
74	Halleck to Deeth	Roadmix Asphalt	11.708
75	Deeth overhead crossing	Roadmix Asphalt	0.246
54–A	Deeth to Wells	Roadmix Asphalt	17.267
54–B	Deeth bridge and Wells overhead	Roadmix Asphalt	0.300
90–D	Wells to Moor	Roadmix Asphalt	10.296
90–A	Moor to Pequop Summit	Roadmix Asphalt	12.641
90–B	Pequop Summit to Silverzone Pass	Roadmix Asphalt	17.202
90–E	Silverzone Pass to Cliffside	Roadmix Asphalt	3.699
90–C	Cliffside to Nevada-Utah State line	Roadmix Asphalt	16.858
	Total mileage Federal Aid Route No. 1		418.479
	FEDERAL AID ROUTE NO. 2		
66–B	Junction Route No. 1 to 3 miles east Fernley	Plantmix Asphalt	1.723
66–A	3 miles east Fernley to Lyon-Churchill County line	Roadmix Asphalt	7.625
66–A	Lyon-Churchill County line to Hazen	Roadmix Asphalt	1.727
34	Hazen to Leeteville	Roadmix Asphalt	8.234
3	Leeteville to Fallon	Roadmix Asphalt	7.614
49	Fallon (west to east city limits)	Retread over Portland Cement Concrete	0.421
49	Fallon (west to east city limits)	Portland Cement Concrete	0.362
49	Fallon (west to east city limits)	Retread over Portland Cement Concrete	0.435
64–A	Fallon to 5 miles south	Plantmix Asphalt	4.984
64–B	5 miles south Fallon to Grimes	Roadmix Asphalt	5.077
24–B	Grimes to 1.3 miles east of Salt Wells	Roadmix Asphalt	6.333
24–A	1.3 miles east Salt Wells to Sand Springs	Roadmix Asphalt	10.409
100–B	Sand Springs to 1½ miles west of Frenchman's Station	Roadmix Asphalt	6.538
45	1½ miles west Frenchman's Station to 3½ miles east Frenchman's Sta.	Roadmix Asphalt	5.000
100–A	3½ miles east Frenchman's Station to Westgate	Roadmix Asphalt	7.703
55	Westgate to Eastgate	Roadmix Asphalt	10.035
55	Eastgate bridge	Roadmix Asphalt	0.186
56–A	Eastgate to Churchill-Lander County line	Roadmix Asphalt	11.601
56–B	Churchill-Lander County line to Campbell Creek Ranch	Roadmix Asphalt	6.108
57	Campbell Creek Ranch to Railroad Pass	Roadmix Asphalt	17.874
96–B	Railroad Pass to Austin (cemetery)	Roadmix Asphalt	19.448
96–A	Austin ((cemetery) to east city limits	Roadmix Asphalt	1.455
93–B	Austin to 12 miles east	Roadmix Asphalt	10.948
93–C	12 miles east of Austin to Lander-Eureka County line	Roadmix Asphalt	23.754
93–C	Lander-Eureka County line to 14 miles west of Hay Ranch	Roadmix Asphalt	9.692
93–A	14 miles west Hay Ranch to Hay Ranch	Roadmix Asphalt	13.831
31	Hay Ranch to Eureka	Roadmix Asphalt	11.131

78–A	Through Eureka to Eureka-White Pine County line	Roadmix Asphalt	10.676
78–B	Eureka-White Pine County line to Pancake Summit	Roadmix Asphalt	13.616
44	Pancake Summit to Illipah	Roadmix Asphalt	21.813
10	Illipah to Robinson Summit	Roadmix Asphalt	14.402
6	Robinson Summit to Keystone	Roadmix Asphalt	12.255
25–A, B	Keystone to Ely (west city limits)	Roadmix Asphalt	4.380
70	Ely (west to east city limits)	Roadmix Asphalt	0.868
70	Ely (west to east city limits)	Portland Cement Concrete	0.691
107–B	Ely to west foot Connor's Pass	Roadmix Asphalt	17.561
107–A	West foot Connor's Pass to west end Forest	Roadmix Asphalt	3.089
107–C	West end Forest to east end Forest	Roadmix Asphalt	4.066
107–A	East end Forest to east foot Connor's Pass	Roadmix Asphalt	1.873
94–D	East foot Connor's Pass to 5 miles south	*Gravel	4.883
94–C	5 miles south Connor's Pass to Lake Valley Summit	*Gravel	15.152
94–B	Lake Valley Summit to Lincoln-White Pine County line	*Gravel	6.930
94–A	Lincoln-White Pine County line to Dutch John's	*Gravel	15.502
69	Dutch John's to Pony Springs	*Gravel	9.562
94–E	Pony Springs to Stonehouse	Roadmix Asphalt	15.733
68	Stonehouse to Pioche	Roadmix Asphalt	13.503
85	Pioche to Caliente	Roadmix Asphalt	10.115
85	Pioche to Caliente	Roadmix Asphalt	14.770
	Total mileage Federal Aid Route No. 2		421.688

FEDERAL AID ROUTE NO. 3

36	California-Nevada State line near Purdy to Reno	Plantmix Asphalt	14.723
9–B	Virginia Street, Reno (north to south city limits)	Plantmix Asphalt	0.080
9–B	Virginia Street, Reno (north to south city limits)	Asphaltic Concrete	1.998
9	Reno to Huffakers	Asphaltic Concrete	5.423
7	Huffakers to Washoe Summit	Asphaltic Concrete	9.155
29	Washoe Summit to Washoe-Ormsby County line	Asphaltic Concrete	10.256
30	Washoe-Ormsby County line to Carson City	Asphaltic Concrete	3.463
60	Carson City (north city limits to near south city limits)	Emulsified Asphaltic Retread	1.035
99–A	Near south city limits to Ormsby-Douglas County line	Emulsified Asphaltic Retread	0.216
99–A	Near south city limits to Ormsby-Douglas County line	Roadmix Asphalt	2.913
99–A	Douglas-Ormsby County line to 8.41 miles north Minden	Plantmix Asphalt	2.824
38–A, B	8.41 miles to 6.06 miles north Minden	Plantmix Asphalt	2.420
99–A	6.06 miles to 3.5 miles north Minden	Plantmix Asphalt	2.614
14	3.5 miles north of Minden to Minden	Plantmix Asphalt	3.443
28	Minden to Gardnerville	Emulsified Asphaltic Retread	1.800
108	Gardnerville to 2 miles north Carters	Roadmix Asphalt	7.193
4	2 miles north Carters to 3 miles north Holbrook	Roadmix Asphalt	6.648
89–C	3 miles north to 5 miles east of Holbrook	Roadmix Asphalt	8.322
89–B	5 miles east Holbrook to Douglas-Lyon County line	Roadmix Asphalt	5.622
89–A	Douglas-Lyon County line to Smith Corners	Roadmix Asphalt	6.010
12	Smith Corners to Hudson-Aurora road	Roadmix Asphalt	2.216
8–A	Hudson-Aurora road to Bulkhead	Roadmix Asphalt	3.909
8–B	Bulkhead bridge and approach	Roadmix Asphalt	0.037
8–C	Bulkhead to Wilson	Graded and Drained	2.327

*Under contract for roadmix asphalt surface.

FEDERAL AID HIGHWAY SYSTEM—*Continued*

F. A. Project	Termini	Type	Length, miles
8–C	Bulkhead to Wilson	Roadmix Asphalt	0.382
33–B	Bridge over East Walker River	Roadmix Asphalt	0.012
33–A	Wilson to 6 miles south Yerington	Roadmix Asphalt	6.737
17	6 miles south of Yerington to Yerington	Roadmix Asphalt	5.719
59	Yerington (south to east city limits)	Portland Cement Concrete	1.426
80–A	Yerington to 9½ miles east	Roadmix Asphalt	9.529
80–B	9½ miles east of Yerington to Lyon-Mineral County line	Roadmix Asphalt	3.537
80–B	Lyon-Mineral County line to Schurz	Roadmix Asphalt	11.193
80–C	Schurz to 10 miles north of Dutch Creek	Roadmix Asphalt	11.611
23	10 miles north Dutch Creek to Dutch Creek	Roadmix Asphalt	10.609
80–D	Dutch Creek to Hawthorne	Roadmix Asphalt	10.422
97–F	Through Hawthorne to 12.8 miles east	Roadmix Asphalt	13.653
97–E	12.8 miles east Hawthorne to 3.3 miles west Luning	Roadmix Asphalt	8.482
97–D	3.3 miles west of Luning to Rhodes	Roadmix Asphalt	20.023
97–C	Rhodes to Mineral-Esmeralda County line	Roadmix Asphalt	7.590
97–C	Mineral-Esmeralda County line to Coaldale	Roadmix Asphalt	13.272
97–B	Coaldale to 8 miles west Millers	Roadmix Asphalt	20.038
97–A	8 miles west Millers to 1.1 miles west Tonopah	Roadmix Asphalt	19.936
88–B	Through Tonopah Township	Roadmix Asphalt	0.635
88–B	Through Tonopah Township	Roadmix Asphalt	1.140
88–A	Through Tonopah Township	Roadmix Asphalt	1.097
11	Tonopah to Millers cut-off road	Roadmix Asphalt	8.674
103	Millers cut-off road to Goldfield	Roadmix Asphalt	16.256
	Total mileage Federal Aid Route No. 3		306.620

SPUR ADDITION TO FEDERAL AID ROUTE NO. 3

F. A. Project	Termini	Type	Length, miles
5	Nevada-California State line to Junction Route No. 3 near Holbrook	Roadmix Asphalt	3.459
			310.079

FEDERAL AID ROUTE NO. 4

F. A. Project	Termini	Type	Length, miles
	California-Nevada State line to Spooners Station	Roadmix Asphalt	12.760
102–A	Spooners Station to Douglas-Ormsby County line	Roadmix Asphalt	2.980
102–A	Douglas-Ormsby County line to Junction Route No. 3	Roadmix Asphalt	7.362
112	Carson City to Ormsby-Lyon County line	Roadmix Asphalt	5.660
115–D	Ormsby-Lyon County line to Dayton	Roadmix Asphalt	5.682
115–A	Dayton to 9½ miles northeast Dayton	Roadmix Asphalt	9.278
115–C	9½ miles northeast Dayton to 12 miles west Lahontan	Roadmix Asphalt	9.905
115–B	12 miles to 2 miles west Lahontan	Roadmix Asphalt	9.986
115–E	2 miles west Lahontan to Lyon-Churchill County line	Roadmix Asphalt	0.658
115–E	Lyon-Churchill County line to Junction Route No. 2 at Leeteville	Roadmix Asphalt	11.459
	Total mileage Federal Aid Route No. 4		75.730

FEDERAL AID ROUTE NO. 5

101–C	California-Nevada State line to Jean	Roadmix Asphalt	12.617
101–B	Jean to Bard	Roadmix Asphalt	16.211
101–A	Bard to Las Vegas (Fifth and Fremont Streets)	Roadmix Asphalt	11.904
101–A	Bard to Las Vegas (Fifth and Fremont Streets)	Portland Cement Concrete	1.965
87–A	Las Vegas (Fifth and Fremont Streets) to 1,650 feet north city limits	Asphaltic Concrete	0.369
87–A	Las Vegas (Fifth and Fremont Streets) to 1,650 feet north city limits	Portland Cement Concrete	1.612
83–A	1,650 feet north city limits to 6 miles southwest Apex	Portland Cement Concrete	0.331
83–A	1,650 feet north city limits to 6 miles southwest Apex	Plantmix Asphalt	8.305
42	6 miles southwest Apex to 2 miles northeast Apex	Plantmix Asphalt	3.295
42	6 miles southwest Apex to 2 miles northeast Apex	Roadmix Asphalt	4.476
37–B	2 miles northeast Apex to 2 miles southwest Dry Lake	Roadmix Asphalt	6.325
37–A	2 miles southwest Dry Lake to Crystal	Roadmix Asphalt	8.272
43–A	Crystal to west slope Mormon Mesa	Roadmix Asphalt	20.219
43–B	Muddy River bridge near Moapa	Roadmix Asphalt	0.041
52	West slope to east slope Mormon Mesa	Roadmix Asphalt	16.022
53–A	East slope Mormon Mesa to Mesquite	Roadmix Asphalt	14.648
53–B	Virgin River bridge	Roadmix Asphalt	0.170
27	Virgin River bridge	Roadmix Asphalt	0.353
53–C	Mesquite to Nevada-Arizona State line	Roadmix Asphalt	1.067
	Total mileage Federal Aid Route No. 5		128.202

FEDERAL AID ROUTE NO. 6

86	Winnemucca Junction Route No. 1 to north city limits	Roadmix Asphalt	1.251
72	Winnemucca to Toll House	Roadmix Asphalt	11.736
71	Toll House to Paradise Hill	Roadmix Asphalt	12.212
132	Paradise Hill to Orovada	Roadmix Asphalt	18.555
119–A	Orovada to 15 miles north	Roadmix Asphalt	15.037
119–B	15 miles north of Orovada to Nevada-Oregon State line	Roadmix Asphalt	15.138
	Total mileage Federal Aid Route No. 6		73.929

FEDERAL AID ROUTE NO. 7

77	Ely to McGill	Roadmix Asphalt	11.509
77	Through McGill	Roadmix Asphalt	1.020
109–A	McGill to Magnuson's Ranch	Roadmix Asphalt	17.561
109–C	Magnuson's Ranch to 14 miles north	Roadmix Asphalt	14.471
109–D	14 miles north to White Pine-Elko County line	Roadmix Asphalt	20.275
109–E	White Pine-Elko County line to Junction Route No. 1 near Wendover	Roadmix Asphalt	53.414
	Total mileage Federal Aid Route No. 7		118.250

FEDERAL AID ROUTE NO. 8

95–C	Junction Route No. 3 near Brown's to Washoe-Storey County line	Roadmix Asphalt	0.622
95–A	Junction Route No. 3 near Brown's to Washoe-Storey County line	Roadmix Asphalt	4.446
95–B	Junction Route No. 3 near Brown's to Washoe-Storey County line	Roadmix Asphalt	2.690
95–A	Junction Route No. 3 near Brown's to Washoe-Storey County line	Gravel	0.353

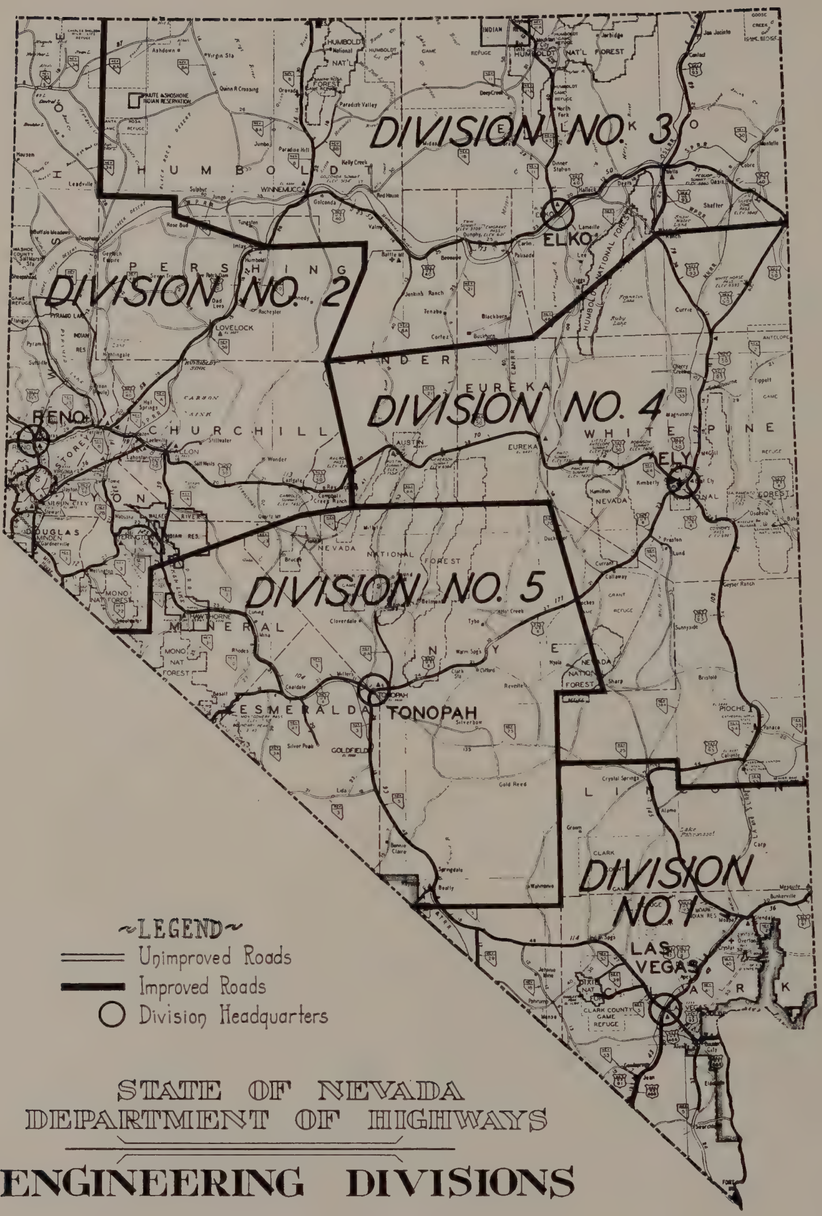
FEDERAL AID HIGHWAY SYSTEM—*Continued*

F. A. Project	Termini	Type	Length, miles
95–A	Washoe-Storey County line to north Virginia City limits	*Gravel	5.117
128	North Virginia City limits to Storey-Lyon County line	Roadmix Asphalt	0.900
128–B	North Virginia City limits to Storey-Lyon County line	Roadmix Asphalt	5.202
128–A	Storey-Lyon County line to Junction Route 2–A	Roadmix Asphalt	2.907
	Total mileage Federal Aid Route No. 8		22.237
	FEDERAL AID ROUTE NO. 9		
110–A	Wells to 3 miles north of Wells	Roadmix Asphalt	3.156
110–B	3 miles north of Wells to Thousand Spring Creek	Roadmix Asphalt	23.217
110–C	Thousand Spring Creek to Little Salmon River	Roadmix Asphalt	23.347
114–B	Little Salmon River to Contact	Roadmix Asphalt	2.455
114–A	Contact to 8 miles north	Roadmix Asphalt	7.978
114–B	8 miles north Contact to Nevada-Idaho State line	Roadmix Asphalt	7.580
	Total mileage Federal Aid Route No. 9		67.733
	FEDERAL AID ROUTE NO. 10		
111–A	Junction Route No. 24 to White Pine-Elko County line	Roadmix Asphalt	4.543
111–A	White Pine-Elko County line to 5 miles north of Currie	Roadmix Asphalt	17.103
111–C	5 miles north of Currie to 26 miles south of Wells	Roadmix Asphalt	31.334
111–B	26 miles south of Wells to Wells	Roadmix Asphalt	25.903
	Total mileage Federal Aid Route No. 10		78.883
	FEDERAL AID ROUTE NO. 11		
113–B	Las Vegas (Fifth and Fremont Streets) to southeast city limits	Roadmix Asphalt	1.530
113–A	Las Vegas to 10 miles southeast	Roadmix Asphalt	10.180
	Total mileage Federal Aid Route No. 11		11.710
	FEDERAL AID ROUTE NO. 12		
	Junction Route No. 3 to Basalt	Unimproved	21.880
118–A	Basalt to Nevada-California State line	Roadmix Asphalt	12.290
	Total mileage Federal Route No. 12		34.170
	FEDERAL AID ROUTE NO. 13		
117	Basalt to Mineral-Esmeralda County line	Roadmix Asphalt	3.243
117	Esmeralda-Mineral County line to Coaldale	Roadmix Asphalt	19.089
	Total mileage Federal Aid Route No. 13		22.332

FEDERAL AID ROUTE NO. 14

	Tonopah (Florence Avenue to east city limits)	Roadmix Asphalt	.400
2	Tonopah east city limits to 3 miles east	Roadmix Asphalt	3.124
	3 miles east Tonopah to West Forest Boundary	Roadmix Asphalt	12.600
	West to East Forest Boundary	*Gravel	12.755
	East Forest Boundary to 1.15 miles east	Roadmix Asphalt	1.147
	Total mileage Federal Aid Route No. 14		30.026

*Under contract for roadmix asphalt surface.



STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

ENGINEERING DIVISIONS

DIVISION MAINTENANCE AND CONSTRUCTION NOTES

DIVISION I

HEADQUARTERS AT LAS VEGAS

J. M. MURPHY, *Division Engineer*

During the July 1, 1936, to June 30, 1938, biennium several noteworthy and important construction projects have been completed in Division I; namely, reconstruction from Las Vegas to three miles southwest of Apex, the Clark Avenue underpass in Las Vegas, and the Jean underpass and approaches near Jean.

Reconstruction of the highway section between Las Vegas and Apex completed another step in the modernization of Route 91 through Nevada, finishing a section of wide, plantmixed surface, oiled shouldered road from Jean, through Las Vegas, to three miles southwest of Apex, a distance of approximately forty miles.

Group Picture of the State Highway Board, Division Engineers, and Departmental Heads on the Steps of Highway Headquarters.

Under the reconstruction contract, the Las Vegas-Apex road was protected as completely as possible from cloudbursts by the installation of numerous timber bridges and large, flat-bottom side drains. In the past, cloudbursts on this section meant road destruction, consequently drainage was a very important construction item.

In Las Vegas, the Clark Avenue underpass was completed August 5, 1937, eliminating a dangerous multiple track grade crossing of the Union Pacific Railroad and providing a double vehicle lane and two individual pedestrian tunnels. The structure was "wet," necessitating placement of a thick-weight slab and an asphaltic membrane seal up to high water elevation throughout the entire structure. This structure ranks in importance with any yet constructed in the State, due to a great density of intercommunity and through traffic being safely carried beneath the main line of a busy railroad.

The Jean underpass, twenty-eight miles south of Las Vegas, now nearing completion, constitutes a long-desired improvement in grade separation and alignment. This improvement eliminates an old, narrow overpass approached by two short radius curves; one on a high fill. The guard rail on these curves was notorious for its scars. The new structure is modern in design from a standpoint of safety as well as beauty, embodies latest ideas for this type of construction, and is a commendable addition to the highway system and Division I.

A Grade-Crossing Elimination Project in Metropolitan Areas, the Clark Avenue, Las Vegas, Underpass.

Maintenance features during the biennium in Division I consist of additional flood damage protection and repair, building and improving maintenance stations, centerline striping, and a signing project on Route 12 between Highway 91 and Overton.

In March 1938, a flood on the Meadow Valley Wash and the Muddy

River washed out one-hundred thirty feet of approaches to the Logandale bridge, a timber-pile structure spanning the Muddy River. The approaches were replaced and protected by timber cribbings and check dams. Splendid cooperation by the WPA, Forest Service, and Park Service in furnishing materials and labor expedited repairs and kept traffic delays and inconvenience to a minimum.

A new maintenance station was built at Alamo and the older stations at Indian Springs and Lathrop Wells have been renovated and brought to present standards.

Jean, Clark County, Underpass Forming Another Safety Factor for U. S. Route 91.

In cooperation with the safety division, approximately one-hundred forty miles of centerline striping was painted throughout the division and an extensive signing project on the Moapa Valley Road, Route 12, where many avoidable accidents have occurred, has been completed.

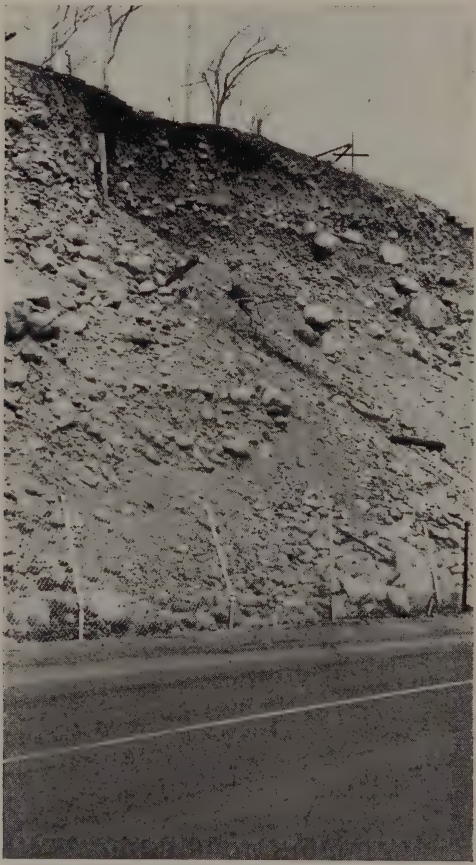
DIVISION II

HEADQUARTERS AT RENO

J. L. HANCOCK, *Division Engineer*

Considerable work has been completed on Route Nevada 1, U S 40, including the improvement of alignment, grade and widening of the road-way to meet the large increase of motorcar and heavy transportation truck traffic.

A very interesting project on this route a few miles west of Reno was completed on August 22, 1938. This project was necessary due to a high-cut bank, consisting of round boulders embedded in a coarse sand formation, situated on a flat vertical and horizontal curve. Any sudden jar, rain, wind or irrigation seepage water would cause the sand



Dangerous Sloughing Bank Along U S 40 at Chalk Bluff, West of Reno, Before a Basket Riprap Project was Constructed.

and boulders to be loosened and roll or bounce onto the lane of travel. This was a very hazardous condition which could not be eliminated by flattening the cut slopes due to residences, pastures, and irrigation ditches above. Therefore, the department had to design a retaining wall of Cyclopean concrete approximately ten feet high and five hundred feet long.

In connection with this wall seven rows of basket riprap were placed on the upper slope. The first row was placed at the top and slightly back of the retaining wall, each succeeding row following this procedure. The basket consists of large stones or boulders, fifty percent being one cubic foot or over in volume. No stone having dimensions less than four inches in thickness or fifty pounds by weight was used. These stones are held in place and shape by a No. 6 electrically welded galvanized wire, having six inch square spaces.

This design was used to check all possible erosion and to eliminate the hazard. This is the first time basket riprapping has been used for slope protection by the Nevada department.

Another Section of Chalk Bluff Before Basket Riprap was Installed on U S 40 West of Reno.

In the city of Reno two large underpasses were completed to eliminate two very dangerous railway crossings. Also two bridges were constructed across the Truckee River to relieve the congested traffic situation in the business section of town. One bridge was made of steel and concrete, the other of reinforced concrete. Both of these bridges were given a severe test of their strength and foundation during the floods of the past winter.

The Geiger Grade highway completed two years ago, with the exception of an oiled surface on four miles just north of Virginia City, has

Basket Riprap and Retaining Wall Near Lawtons, West of Reno, Eliminating Falling Rock Hazard on U S 40.

Stretch of U S 40 West of Reno, Showing Riprap and Retaining Wall Construction in Completed Stage.

brought much favorable comment to the department. For the enjoyment of travelers over this route a road-side improvement project was completed. Picnic grounds with tables, benches, and fireplaces have been landscaped on a pine-tree-covered flat overlooking all the surrounding valleys.

An oiled highway has been completed to Pyramid Lake.

Many miles of farm-to-market highways have been constructed, with an oiled surface, throughout the division.

Patching and reconditioning of roadway surface and shoulder breakdowns are the major summer maintenance operations. Maintenance of shoulders has been given considerable attention to promote vegetation, thereby checking dust and erosion. All desirable vegetation is being mowed instead of bladed because blading destroyed the root. A small amount of cheim-cote weed killer was tried on noxious weeds and proved to be very satisfactory.

Snow removal from the highways during the winter months is being handled in this division by two large Sno Go units, supplemented by many smaller V plows and angle blades.

Many miles of traffic line have been painted, especially on winding roads, with special attention being given to sharp vertical and blind horizontal curves.

Type of Nevada Feeder Road, Found Near Beowawe, Lander County, Ready for Oil Surface Treatment.

DIVISION III

HEADQUARTERS AT ELKO

F. H. DEPP, *Division Engineer*

Eleven projects were placed under contract and completed during the biennium starting July 1, 1936, and ending June 30, 1938, at a cost of $1,131,677.

ELKO COUNTY

Contract 484, on Route Nevada 11, had roadmix only over a length of 10.801 miles.

Contract 498, on Route Nevada 1, plantmix project covering 16.975 miles.

Contract 499, on Routes Nevada 1, and U S 93, having a roadmix only, on 79.060 miles.

Contract 509, on Route Nevada 1, consisting of approaches over a length of 1.29 miles.

Contract 510, on Route Nevada 43, with a grading project covering 8.25 miles.

HUMBOLDT COUNTY

Contract 489, on Route Nevada 8, with a grading project of 0.263 miles.

Contract 492–A, on Route Nevada 8, roadmix surfacing on 0.658 miles.

Contract 492–B, on Giroux Street, Winnemucca, roadmix only, on 0.060 miles.

Contract 505, on Route Nevada 1, plantmix project over 7.118 miles.

Contract 518, on Route Nevada 8–B, gravel project on 10.03 miles.

WHITE PINE COUNTY

Contract 499, on Route U S 93, combined with the Elko County sector, of 79.060 miles of roadmix only.

EUREKA COUNTY

Contract 527, on Route Nevada 21, gravel project on 4.62 miles.

Two projects for which contracts were awarded during the biennium were not completed on June 30, 1938. The amount involved in these projects is $158,959, and include Contract 522 in Eureka County on Route U S 40 which was an overpass and approaches with a length of 0.792 miles, and Contract 543 in Elko County on Route Nevada 43 being a grading project covering 12.05 miles.

Four projects on which contracts had been awarded previous to July 1, 1936, were completed during the biennium at a cost of $309,996. These included three in Humboldt County consisting of Contract 460 on Route Nevada 8, a concrete bridge having a length of 0.047 miles; Contract 461, on Route Nevada 8, a concrete overpass with a length of 0.037 miles and a roadmix only project under Contract 482, on Route Nevada 8, with a length of 60.944 miles, and one gravel project in Elko County under Contract 469, on Route Nevada 11, with a length of 10.15 miles.

Four day-labor projects were undertaken and completed at a cost of $12,000. They were all in Elko County. Contract 101 under this classification consisted of placing fencing along U S 40. Contract 102 was a roadmix only project on the Lamoille feeder, with a length of .98 miles. Contract 117 was another plantmix only project on U S 40, with a length of 0.05 miles. Contract 124 consisting of a masonry wall on U S 40, with a length of 0.20 miles.

CONSTRUCTION PROJECTS OF SPECIAL INTEREST

Contract 498. Covered 17 miles of U S 40 between Carlin and Elko. Former highway had excessive curvature and many short sections of steep grade. The combination of short radius curves and sharp vertical curves made this section slow and dangerous.

Roadway was widened to thirty feet, with flat cut and fill slopes. Twenty-two feet of plantmix asphalt surface was placed, with four feet of crushed rock oil-treated shoulders.

Showing the Depth of Snow on U S 40 in Elko County.

Base consisted of 4½ to 7½ inches of crushed rock sub-base covered with 3½ inches of crushed plantmixed base (slurry).

Contract 499. For roadmixing oil surface on 79.06 miles of U S 93 between U S 40 at Wells and U S 50 at Becky Spring, was the longest oil-mix job undertaken by the Highway Department. It brought the portion of U S 93 in Division III to a high standard of oiled highway.

Contract 505. Extended from five miles west of Winnemucca to and through the city of Winnemucca. This section was realigned and widened to a thirty-six foot roadway for five and one-half miles and to an eighty- and one hundred-foot section for one and one-sixteenth miles.

A two and one-half inch bituminous plantmix surface was laid twenty-two feet wide. Seven-foot shoulders were built from oil-mixed material reclaimed from the old roadway, thus effecting a thirty-six foot width of paving.

Through the city section the surface varies from fifty-six to seventy-six feet, with curb and gutter and sidewalks.

About one and one-half miles of two-inch water pipe was laid preparatory to landscaping.

Trees and shrubs were planted later by State forces.

A combination of contracts 460, 461, 482, 489, and 492A and 492B, built at a cost of approximately $300,000, completed Nevada 8 to a high-speed oil-paved highway from Winnemucca to the Nevada-Oregon line at McDermitt. These contracts covered a bridge over the Humboldt River, overpass over the Western Pacific Railroad, and sixty miles of road asphalt surfacing.

Contracts 469, 484, 510 and 527 cover 30.45 miles of new highway on Nevada 11 and 43 between Elko and the Nevada-Idaho line at Owyhee. This new mileage combined with fifteen miles previously built by the State, ten miles built by the Bureau of Public Roads as a Forest Project and 4.75 miles built by the U. S. Bureau of Indian Affairs places this important interstate route in line for early completion.

MAINTENANCE

Maintenance work was performed over 466.91 miles of road in Division III. This mileage is divided as to type of surface as follows:

Portland cement concrete	3.01 miles
Plantmix asphalt	23.12 miles
Roadmix asphalt	419.46 miles
Gravel and stone surface	68.82 miles
Unimproved earth	52.50 miles

Activities are carried on under the Division III office in Elko, Nevada, with a personnel consisting of Division Engineer, Office Manager, Superintendent, nine foremen and twenty-five helpers. Extra labor is hired when needed. The average annual expense is approximately $125,000.

Maintenance work classifies itself under five headings:

(1) Routine work such as patrolling, removing debris, cleaning culverts and roadway ditches, patching surface and shoulders, repair fences, erect and paint signs, markers and guard rail, repainting traffic stripe and other necessary activities of limited nature.

(2) Specific maintenance is of a betterment nature and embraces (1) erection of buildings, (2) recondition and seal of oiled surfaces, (3) furnishing and erecting snow fence, (4) right of way fence, (5) retaining walls and other projects too large to be considered as general maintenance. During the biennium there was expended on the above items approximately these sums:

(1) Land and buildings	$30,000
(2) Recondition and seal	20,000
(3) Snow fence	2,000
(4) Right of way fence	5,000
(5) Rock wall	4,000

(3) Snow removal. Some snow removal is necessary on most of the mileage in Division III. It is heaviest on the mountain summits, and on some sections of very flat country subject to drifting wind. Snow fence is used to some extent over these areas.

Work is carried on with regular maintenance forces, and equipment plus extra labor and special snow-fighting units when needed.

Equipment available for snow removal in Division III consists of two Sno Go rotaries, Rightway rotary, 1-50 cat and dozer, 1-30 cat, 4 four-wheel-drive trucks with V plows, 8 two-ton trucks with blade or V plows, and 4 motor patrols. Sanding of icy roads is regular practice.

(4) Bridge maintenance. Twenty-eight bridges of more than twenty feet are maintained in Division III. Bridges are numbered and maintenance cost for the various features is drawn from a separate allotment of State funds.

(5) Equipment maintenance. All maintenance and some survey equipment is kept in repair in the division shop at Elko. Personnel consists of foreman, two mechanics, one helper, and a watchman.

The present shop, constructed during 1936–1937 at a cost of $21,000, is equipped to make all repairs to motor equipment except for heavy blacksmithing, body and fender work, and electrical work.

Traffic studies are carried on throughout the year by two automatic counting machines (electric eye) and by a seven-day manual count taken during July. Twelve checking stations furnish count at seven locations on Nevada U S 40, three on Nevada 8, two on Nevada 8A, one on Nevada 21, one on Nevada 46, one on Nevada 11, one on Nevada 43, and one on Nevada 13, U S 93.

DIVISION IV

HEADQUARTERS AT EAST ELY

C. C. BOYER, *Division Engineer*

During the biennium, the highway improvement activities were entirely devoted to the reconstruction of existing highways and the construction of roadmix oil-graveled surface. The following shows the projects and mileage of each type of work:

LINCOLN COUNTY

Contract 457 was a gravel project of 15.733 miles length from Stonehouse to Pony Springs. Contract 495 was a gravel project of 14.322 miles length from ½ mile north of Caliente to 1 mile north of Panaca Junction. Contract 513 consisted of a gravel project extending from Pony Springs to 5.4 miles north of Dutch John's, with a length of 14.961 miles. Contract 515 was a gravel project extending from 5.4 miles north of Dutch John's to the Lincoln-White Pine County line, having a length of 10.104 miles.

WHITE PINE COUNTY

Contract 517 was a gravel project extending from the Lincoln-White Pine County line to 2.35 miles northwest of the east foot of Connor's Pass with a length of 29.318 miles.

ELKO COUNTY

Contract 531 consisted of the construction of drainage structures between 5 miles north of Currie to 26 miles south of Wells, having a length of 4.828 miles.

ROADMIX PROJECTS

Contract 476 in White Pine County extending from Lund to Preston, having a length of 5.376 miles. Contract 528 in White Pine County, extending from Keystone to Ely, with a distance of 4.714 miles. This contract was 35 percent completed June 30, 1938. Contract DL 99, in White Pine County, on city street, Mill Street, Ely, with a length of 0.880 miles. Two roadmix projects were carried out in Lincoln County. They were Contract 502 from Stonehouse to Pony Springs, with a length of 15.733 miles, and Contract 506 extending from ½ mile north of Caliente to 1 mile north of Panaca Junction, with a length of 14.961 miles.

From the foregoing it may be observed that 84.438 miles of highway were reconstructed. This reconstruction included widening of roadbed, improvement of alignment and grades, as well as widening and increased thickness of surface. The cost of reconstruction of the 84.438 miles of highway performed under the six (6) contracts totaled $645,054.

There were 41.664 miles of roadmix surface completed as of June 30, 1938, at a total cost of $85,483. As of this date, Contract 528 is approximately 35 percent completed, work to the value of $85,000 having been completed.

The following contracts have been awarded but no work has been

A Portion of Beautiful, Although Small, Kershaw Canyon–Ryan State Park, Which is a Part of the State Park System.

performed. It is anticipated they will be under way shortly after July 1, 1938:

Contract 539, in White Pine County, consists of the installation of grade-crossing signals in Ely. Contract 545 in White Pine County is a roadmix project from the Lincoln-White Pine County line to the east foot of Connor's Pass, having a length of 26.97 miles. Contract 544 is in Lincoln County consisting of a roadmix project from Pony Springs to Lincoln-White Pine County line, having a length of 25.06 miles.

The estimated cost of these projects is $100,809.

The reconstruction of the highways listed above was largely because of increased traffic on what may now be termed roads of obsolete type and design. The widening of roadbeds and improvement of alignment and grades in the interest of safety were the important features of the reconstruction.

In preparing the design, considerable attention was given to the problem of snow removal, with the thought of reducing that work under maintenance.

The outstanding project was the reconstruction of the highway between Caliente and Panaca Junction which eliminated dangerous curvature and narrow roadbed. The contractor, using modern road-building equipment, such as large tractors and hydraulic operated scrapers, large power shovels and trucks, completed the 14.32 miles of highway in slightly more than one-half of the two hundred days allowed under Contract 495.

One of the interesting features of construction on this project was the use of explosives for fill settlement for embankments constructed across several swamps encountered.

MAINTENANCE

General maintenance activities, such as repairs to surface, roadbed, culverts and drains, snow removal, and signs were performed by a regular maintenance crew of twenty-nine (29) men. During extraordinary snow removal work such as was encountered during the winter of 1936–1937, this crew was augmented by enough extra labor to keep the highways passable at all times. Occasionally, a few extra laborers have been required on account of damage to the roadbed by "cloudbursts."

Traffic stripes have been maintained between Keystone and Ely and between Ely and McGill, the sections of heaviest traffic.

Directional signs have been installed along U. S. Routes 6, 50 and 93, and all junctions have been completely signed.

The snow removal equipment of ten (10) V-type and twelve (12) blade-type push snowplows was supplemented by a Sno Go rotary snowplow during the winter of 1936–1937, and with two (2) Sno Go rotary snowplows during the winter of 1937–1938. The acquisition of the two rotary plows has contributed very greatly to the successful removal of the snow from the highways in this district.

During the winter of 1936–1937, one of the most severe since the department engaged in snow removal, the highways in this district were passable for traffic with few delays, while during the winter of 1937–1938 the highways were passable at all times.

During the past two years numerous replacements of trucks and motor patrols have been effected. At present, the equipment available for maintenance activities is more complete and up to date than at any time heretofore.

With department equipment and forces 21.4 miles of oil-graveled surface have been reconditioned and 38.8 miles of seal coat applied, restoring the oil-gravel surface to a satisfactory condition.

DIVISION V

HEADQUARTERS AT TONOPAH

J. D. MEACHAM, *Division Engineer*

Probably the most important project in Division V during the past biennium has been the construction on Route 4 through the Nevada National Forest commencing some 15 miles east of Tonopah at the west Forest boundary and continuing to the east Forest boundary. This distance approximates 13 miles. Prior to its improvement it was the poorest section of road between Tonopah and Ely because of narrow roadbed, many sharp curves, and poor surface. With the completion of grading and oiling since the end of the biennium June 30, 1938, this section of road is now in excellent condition. The usual design for highways was modified somewhat on this section to meet the severe snow condition encountered during the winter on certain portions. Cut slopes in common material were flattened on a ratio of 4 to 1.

Work on Route 8–A between Tonopah and Manhattan has been carried on with the cooperation from Nye County officials and the Works Progress Administration. The grading and structures on the first five miles of this route were financed by State and county funds; on the next 7.7 miles Nye County and the Works Progress Administration financed the purchase of the culvert pipe, and this pipe was installed by WPA labor under State supervision. Dry rubble headwalls were constructed on all culvert pipe by WPA forces. The subsequent grading and graveling on this section was carried on as a Federal Lands Project.

In addition to the usual maintenance operations carried on during the past biennium, the following projects were completed with State Highway Department forces:

On Route 3, 16½ miles of road were constructed. This extended from the junction of Route 3 with Route 5, 15 miles south of Goldfield, to the mouth of Lida Canyon about 3 miles east of Lida. Although this 16½-mile stretch of road was graded and some 10 miles of it surfaced with pit-run gravel, at a total cost of approximately $5,600, the road is entirely adequate for the traffic using this route. Some 8 miles of similar road was constructed from a point 8 miles west of the junction of Routes 3 and 5 to Gold Point with the cooperation of Esmeralda County and the WPA.

A special appropriation of $4,000 was expended for the purpose of scaling loose rock from the cliffs along Walker Lake on Route 3. This rock was used to reinforce fills along portions of the lake where wave action had caused some erosion.

Exceptionally heavy rains fell in the vicinity of Beatty early in March 1938. These rains caused damage to the highway in that section, requiring an expenditure of some $4,000 for repairs. In this work the dips across the Amargosa River near Beatty were repaired and improved by the construction of grouted riprap slopes and rubble masonry apron walls. This construction work, it is felt, will be entirely adequate to handle any flood waters which may come in the future.

Picnic Shelter Station in Valley of Fire State Park, with the Strangely Eroded Sandstone in the Background.

With the cooperation of the WPA a flood control channel was constructed above the town of Beatty as a protection from possible cloudburst damage.

A new maintenance station was constructed at Hawthorne on ground facing the highway at the eastern end of town. A new station was also constructed at Luning. Additional ground was purchased for the division equipment yard at Tonopah, and the same was improved by the erection of several additional equipment sheds. The Drumms Wells maintenance station was improved by the construction of a standard maintenance house of stone, cut stone for which was obtained from old walls in Goldfield, and a three-thousand-gallon tank was installed on a thirty-foot tower at this station to provide ample fire protection.

Wells were drilled at Luning and Coaldale and new pumps installed at Luning, Coaldale, Lida and Drumms Wells. Standard 5-foot fencing was placed around the following maintenance stations: Hawthorne, Luning, Coaldale, Basalt, Tonopah, Goldfield, and Drumms Wells. Underground storage facilities for gasoline were installed at Hawthorne, Luning, Coaldale, Basalt, Goldfield, and Drumms Wells.

Maintenance equipment has been improved and augmented by the purchase of four F. W. D. trucks, several lighter trucks and one caterpillar No. 11 motor patrol.

A list of all construction projects in Division V during the past biennium is shown in tables elsewhere in this report.

SURVEYS AND RECONNAISSANCE

P. R. Rawls, *Location Engineer*

Reconnaissance and survey work was carried on quite extensively during the last biennium. Surveyed mileage on feeder road projects was approximately the same as shown for the previous biennium; however, there was a decrease of approximately 32% on Federal and State routes. This decrease does not, in any sense of the word, indicate a deficiency in location surveys, but is in truth an efficiency measure in which an effort was made to obtain a more satisfactory coordination with construction programs as planned by the Highway Department.

Winter Location Parties Carry Out Their Work Under Difficult Conditions.

Funds for highway construction, largely derived from Federal appropriations, are definite controlling factors in our highway construction. Therefore, extreme care must be exercised in coordinating location surveys with construction programs as allowed by funds available. Surveys made too far in advance of actual highway construction become obsolete within a few years, also partially extinct, resulting in additional expense in having to make a resurvey of said projects when the improvement becomes necessary and funds are available for construction.

At the present time practically all of Nevada's Federal aid routes have been constructed; some portions have been reconstructed. On first stage construction a few years back, it was necessary to construct as many miles of highway as possible on a cheaper location and roadway design, which was satisfactory for the traffic at that time. Since that time, type and greatly increased amount of traffic has made it necessary to improve on highway location and roadway design. In order to maintain a well-balanced highway system, the location must blend with the type of construction. Consequently, considerable changes in highway location are being made in line with improving roadway designs. An effort is being made to obtain a certain degree of permanency in location, with the safety factor heading the list of controlling features in both location and design.

In 1935, Federal funds were allotted for feeder road or farm-to-market road construction. Highly improved ranching and farming areas in the State of Nevada are comparatively few and well scattered; consequently, only a few of the seventeen counties have eligible farm-to-market road projects. However, inasmuch as mining is one of the principal industries from which much of the State's revenue is derived, mine-to-market roads are considered eligible for feeder road projects; provided such mining districts are well established producers and have comparatively definite future possibilities. During the past biennium numerous surveys on feeder road projects were completed, with several of the projects being constructed.

Location Crews Working on a Feeder Road of the Highway System.

During the last biennium the cost per mile for surveys slightly exceeded that of the previous biennium. This increase in cost is well accounted for in that more detailed surveys are required for ever changing improvement in highway design necessary to the type and increasing amount of traffic. Also during the last biennium, location surveys were made on three or four difficult projects which were responsible to a great extent for the increased average costs. On a portion of the Victory Highway in Washoe County, near Verdi, which is one of the heaviest traveled sections in the State, high type construction is being adopted. Due to adverse right of way conditions, numerous alternate surveys were necessary in order to obtain the best possible location over which the right of way could be secured. On a mountainous section in Storey County, Virginia City north five and one-half miles, mining conditions, steep grades, and bad snow conditions on the old road necessitated several preliminary and alternate surveys in an effort to better these conditions. The survey cost of this project was $440 per mile, as compared to $152 per mile on a section over open country in Eureka County.

The following table shows the total amount of surveyed mileage, segregated as to the various counties, computed during the last two biennial periods, 1934–1936 and 1936–1938:

	TOTAL MILEAGE OF SURVEYS		FEEDER ROADS	
County	July 1, 1934, to June 30, 1936	July 1, 1936, to June 30, 1938	July 1, 1934, to June 30, 1936	July 1, 1936, to June 30, 1938
Churchill	61.13	76.91	16.96	15.75
Clark	80.92	85.61	9.77	8.63
Douglas	23.82	20.13	7.50	17.88
Elko	121.01	137.62	20.00	24.00
Esmeralda	80.15	2.00	36.49	
Eureka	.60	80.98	....	6.73
Humboldt	49.73	54.91	6.00	
Lander	81.70	27.35	....	17.33
Lincoln	82.13	56.55	....	15.50
Lyon	57.99	8.02		
Mineral	60.59	22.44		
Nye	138.02	32.94	12.90	
Ormsby	2.86	8.16	2.86	
Pershing	9.85	54.88	9.85	13.15
Storey	3.44	5.97		
Washoe	66.24	31.90	10.71	20.67
White Pine	96.62	31.69	5.34	
	*1,018.80	*738.06	138.38	139.64

Cost per mile of surveys, July 1, 1934, to June 30, 1936............ $181.67
Cost per mile of surveys, July 1, 1936, to June 30, 1938............ †190.86

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*Total mileage represents final or accepted surveys only, and not preliminary and alternate surveys, and includes feeder road surveys.

†Computed from total cost of all reconnaissance and surveys, $140,863.41 for the biennium.

Showing Construction in Progress of the Shoshone Overpass in Elko County.

PLANS AND DESIGN

George R. Egan, *Engineer of Design*

Perhaps the most notable progress in design for Nevada highways during the past biennium has been the more scientific approach to the problem of fitting the highway to the speed requirements of traffic. This need of designing highways for definite speeds has been recognized for a number of years. Only recently, however, have concerted efforts been made to evaluate all of the factors involved. Approach to the problem necessitated a great deal of research by the Highway Department. Research work was carried out in conjunction with other State, Federal and private agencies. While a complete solution of the problem has not been reached, the advance made in design standards is reflected in increased safety and service of roads.

Completed Shoshone Overpass, Carrying Traffic Across the Western Pacific.

It is now possible to design a highway for the maximum anticipated speed of traffic and to keep the same standard of design consistent throughout any section of highway. This design is adding immeasurably to the safety of the highway.

In general, design of major routes is based on a safe speed of at least sixty miles an hour. In regions having rough terrain, where construction costs prove excessive to permit such speeds, it becomes necessary to reduce the design speed to forty or fifty miles an hour.

So-called secondary or feeder roads require as much study and care in design as the primary arteries, and such roads often cost as much or more to construct than do the main highways. Design standards, however, are somewhat lower for this type of road because the nature of the roads and terrain traversed in many cases offers greater difficulties.

Secondary roads are primarily local service roads in farming communities or roads leading from such communities, or from mining and other industrial centers to main highways or railroads to provide an outlet for commodities. Inherent safety factors must be designed into these roads, for the public demands of them practically the same service which it demands of the main highways. In fairly open country reasonably high speeds are common. To meet this condition unexepected sharp curves or other hazards must be given consideration and standards for grades and alignments must be adopted which are only slightly lower than those used on the major highways.

A New High Type Reconstruction on U S 40, Showing the Wide Shoulders and Durable Hard Surface.

Secondary roads in farming areas require a higher grade line than those in undeveloped sections because of the prevalence of moisture. Moisture must be kept out of the subgrade in order to secure a stable surface. These higher grade lines require larger quantities of material which, in most cases, must be imported from a distance. Loads transported on secondary roads are often equal to or greater than those transported on main highways. As a result, base and surface courses must have substantially the same load-supporting characteristics. All of these factors tend to increase the cost of both design and construction.

A base course of sufficient strength to withstand anticipated loads is essential to provide for a smooth and long-lasting surface. This has been secured by using a plant-processed gravel insuring uniformity and a high degree of compaction. The department has recently developed a method whereby a graded gravel is processed on the roadsite, eliminating the need for plant installation, and through this method reducing costs of this item by nearly one-half.

Departure from stereotyped forms is evidence of advance in the design of bridges and other structures. By selecting a type most suitable to the site and to the materials available, a greater economy of materials and construction has resulted. This method also produces structures of more durability and a design of greater beauty.

In addition to the elimination of grade crossings by separation of levels of railroads and highways, an important step has been taken to provide increased safety at minor crossings. This greater safety has been achieved by the installation of automatic warning signals. This type of signals is also to be installed as a temporary expedient at major crossings until funds become available for grade eliminations.

Signals are of two types, flashing light, and wigwag. Both have the same general effect of two horizontal lights flashing alternately. In addition, the wigwag signal has a swinging banner which is visible in daylight. Use of the wigwag type is confined to the southern part of the State, where snow and ice conditions do not interfere with its operation. Use of automatic signals will become increasingly more important, particularly for protection of minor railroad-highway crossings.

PLANS COMPLETED, JULY 1, 1936, TO JUNE 30, 1938

County	Construction and reconstruction, miles	Bituminous surface only, miles	Bridges, number	Other projects, number
Churchill	44.943	11.787	7	----
Clark	49.623	9.035	12	----
Douglas	16.056	7.547	----	----
Elko	129.521	86.121	1	----
Esmeralda	21.362	10.681	----	----
Eureka	5.410	---------	1	----
Humboldt	18.134	0.718	----	*2
Lander	----------	---------	----	----
Lincoln	124.575	85.188	3	----
Lyon	14.166	2.066	1	----
Mineral	----------	---------	----	----
Nye	146.118	69.527	1	----
Ormsby	1.010	---------	----	----
Pershing	7.278	5.237	----	----
Storey	8.397	3.441	----	----
Washoe	40.352	30.216	2	*1
White Pine	66.435	32.394	2	----
	693.380	353.958	30	

Total cost, plans and estimates roadway	$107,072.39
Total cost, plans and estimates bridges	20,968.25
Grand total	$128,040.64

*Landscaping projects, consisting of two roadside improvement projects within the city of Winnemucca, one on Route 1 and the other on Route 8, and the construction of an observation point with parking areas and approach roads at Geiger Lookout on Route 17.

RIGHT OF WAY

DALE B. PRUETT, *Right of Way Engineer*

Construction of a highway project cannot be started until all lands needed for rights of way have been acquired or the promise of a conveyance secured. Surveys, plans, and design of project must be completed, however, before the right of way department can function.

When a project has been designed and the alignment of the road determined, the right of way department prepares maps and sketches from which right of way engineers or agents write brief, station to station, descriptions of the parcel or parcels required. A preliminary agreement is then drawn for each parcel owner. Blueprint maps and the agreements are taken by the representative of the department assigned to the project, and negotiations for the securing of these land parcels are carried on with the owners. Any provisions and conditions agreed upon during such negotiations are stipulated in the agreements, and the transaction is completed when the terms are approved by the Board of State Highway Directors and the State Highway Engineer.

In cases where the county or city governments have obligated themselves to purchase rights of way for a particular project, the County Commissioners or the City Council approves the transaction. Assistance in right of way matters by a city or county is not always needed, but in most cases it has been found that the local governments willingly cooperate financially in the matter of securing rights of way when requested.

Before the construction of the highway project is completed, full and final maps and descriptions are prepared, then deeds are written and presented to the land owners for execution. Executed deeds are always recorded immediately.

Land owners are usually requested to donate the right of way needed for a highway construction project. When a money consideration is demanded by the owner or owners, the sum usually offered is equivalent to twice the assessed value per acre of the land taken. Condemnation proceedings are instituted only in exceptional cases where an exorbitant price is asked by the owner and no equitable settlement can be reached. It is gratifying to note that in the majority of instances a fine spirit of cooperation has been shown by the land owners.

The only local conditions which required a marked divergence from the procedure outlined here, are those where Federal lands and reservations or State lands are crossed by the highway system. Federal lands are largely involved in the work, because of the fact that approximately 87 percent of the total area of this State is owned by the United States Government. The Federal Government grants rights of way across its lands four hundred feet in width; the State reserves rights of way across its lands two hundred feet wide.

The system in use for obtaining rights of way is simple and so designed that one person can handle practically every phase of the acquisition work. Even with a limited personnel it is possible to cover the State with efficiency. It has been felt, however, that there is some duplication of effort in securing preliminary agreements as well as deeds. With a slightly increased personnel it would be possible to obtain final deeds immediately and thus avoid complications which frequently arise during the interim between signing of an agreement and preparation of the deed.

Options for the purchase of borrow material by the yard or ton from privately-owned lands are secured for the benefit of the highway project contractor who, after being awarded the contract, makes his own purchase agreement with the land owner for this material. Federal withdrawal of material deposit sites for the biennium totaled 78. Because these withdrawals have been secured and granted by the Federal Government to the State of Nevada at no cost whatsoever, they have eliminated excessive costs for highway construction materials in sections where government lands are located.

Property for channel changes and vision areas is generally made the subject of easements or revocable permits.

During the biennium the construction of some 75 miles of feeder roads, that is mine-to-market and farm-to-market roads, has been financed by Federal aid secondary highway funds and carried out by the Nevada Department of Highways. Payments for rights of way on feeder routes have been met by the county in which the project was located, since the State Highway Fund is deemed expendable only on the primary system of highways. Counties have also cooperated with the State in meeting costs for certain construction materials, regarded as right of way concessions, when such materials are not eligible for Federal aid participation.

New maintenance sites acquired for the erection and enlargement of maintenance stations are listed in the following tables.

At the close of this biennium the department had acquired a total of 12,976.52 acres of privately-owned land at a cost of $192,482.11, or at the rate of $14.83 per acre. Acquisition of Government-owned lands in the amount of 80,021.62 acres has been secured at no cost whatsoever to the State of Nevada. The average unit cost of all lands acquired for right of way purposes was $2.07 per acre.

MAINTENANCE SITES ACQUIRED

July 1, 1936, to June 30, 1938

County	Location	Type of site	Cost
Clark	Mesquite	1.00 acres	$100.00
Clark	Alamo	1.64 acres	50.00
Clark	Charleston Park	0.87 acres	None
Elko	Contact	2 lots	1.00
Elko	Elko	3.70 acres	20.00
Elko	Deeth	2 lots	50.00
Esmeralda	Lida	1 lot	30.00
Esmeralda	Coaldale	2.00 acres	None
Eureka	Primeaux	2.45 acres	25.00
Humboldt	Orovada	2.00 acres	1.00
Lincoln	Pioche	0.59 acres	1.00
Lyon	Yerington	0.25 acres	1.00
Mineral	Hawthorne	3 lots	15.00
Nye	Tonopah	1 lot	500.00
Nye	Beatty	2 lots	80.00
Nye	Tonopah	1 lot	200.00
White Pine	Illipah	Lease	2.00
White Pine	Ely	10 lots	900.00
Total cost			$1,976.00

TOTAL ACRES OF LAND ACQUIRED FOR HIGHWAY RIGHT OF WAY TO JUNE 30, 1938

Route	Private	Government	Total private and Government	Total cost through private land	—Cost per Acre—	
					Private	All lands
1	3,597.22	5,709.84	9,307.06	$68,412.78	$19.02	$7.35
1A	111.99	1,309.91	1,421.90	100.00	.89	.07
1B	449.32	378.07	827.39	2,144.70	4.77	2.59
2	442.35	11,391.34	11,833.69	14,751.64	33.35	1.25
2A	423.95	1,640.36	2,064.31	984.67	2.32	.48
2B	128.46	442.36	570.82	380.00	2.96	.86
3	1,269.12	5,622.17	6,891.29	67,907.72	53.51	12.08
4	229.76	6,086.82	6,316.58	156.00	.68	.02
5	3,198.30	8,973.72	12,172.02	4,691.94	1.47	.39
6	329.26	4,904.66	5,233.92	5,222.13	15.86	1.06
7	592.67	9,726.38	10,319.05	5,167.69	8.72	.50
8	249.02	2,913.02	3,162.04	1,225.03	4.92	.39
8A	56.71	1,782.95	1,839.66			
8B	88.23	531.34	619.57	21.80	.25	.04
9	141.35	144.82	286.17	7,845.20	55.50	27.41
10	11.29	541.30	552.59	100.00	8.86	.18
11	144.95	477.02	621.97	786.64	5.43	1.26
11A	11.92	....	11.92			
12	79.11	189.36	268.47			
13	398.83	5,572.57	5,971.40	1,077.27	2.70	.18
15	7.20	1,051.28	1,058.48			
17	202.74	414.61	617.35	7,101.00	35.03	11.50
19	23.14	9.83	32.97			
21	52.66	....	52.66	116.00	2.20	2.20
24	4.79	6,107.08	6,111.87			
26	....	133.15	133.15			
27	30.47	....	30.47	950.00	31.18	31.18
29	....	802.51	802.51			
32	17.60	....	17.60			
33	270.82	370.64	641.46	212.90	.79	.33
36	12.23	....	12.23			
37	76.60	....	76.60	1,367.00	178.46	178.46
38	43.50	301.66	345.16	820.00	18.85	2.38
43	269.33	602.03	871.36	940.00	3.49	1.08
46	4.19	....	4.19			
47	.50	971.40	971.90			
53	6.94	322.37	329.31			
58	....	597.05	597.05			
Totals	12,976.52	80,021.62	92,998.14	$192,482.11	$14.83	$2.07

TOTAL ACRES OF LAND ACQUIRED FOR FEEDER ROAD RIGHTS OF WAY FROM JULY 1, 1936, TO JUNE 30, 1938

County	Location	Acreage		Total private and Government	Total cost through private land	Cost per Acre	
		Private	Government			Private	All lands
Churchill	Fallon to 3 miles north	24.18	....	24.18	$1.00	$0.04	$0.04
Churchill	Sheckler land	36.82	....	36.82	1.00	0.03	0.03
Elko	City of Elko to Lamoille road	9.54	....	9.54			
Ormsby	State Prison road east	5.75	12.27	18.02			
Pershing	Lovelock north	16.84	....	16.84			
Washoe	North Sierra Street	7.18	....	7.18	166.24	23.15	23.15
Washoe	South Plumas Street	1.68	....	1.68			
White Pine	Mill Street (city of Ely)	5.59	....	5.59	141.00	25.22	25.22
Totals		107.58	12.27	119.85	$309.24	$2.87	$2.58

MATERIALS, TESTING AND RESEARCH

The Materials and Research Laboratory of the Nevada Highway Department is now located in a new building adjacent to the Headquarter's Office in Carson City. This new building was ready for occupancy about September 1, 1936, and the testing department, which had been located in the basement of the Heroes Memorial Building, moved into the new quarters the first week of that month. With the additional room and new equipment made possible by this move it has been possible to carry on the testing work in a more efficient manner. One addition since has been a new soils department which utilizes the full-time service of three to four men. To supplement the material survey crews in the field a crew for subgrade sampling was added and is kept busy nearly full time making soil surveys or subgrade investigations. This in turn, keeps two men in the laboratory busy running grading analyses, liquid and plastic limits, centrifuge moisture equivalents, field moisture equivalents, specific gravity and shrinkage factors. When these tests are completed it is possible to classify the soils. The designing department then have definite information on which to base their design.

Additional work is also being done by the materials survey crews, which of course, increases the work in the laboratory. When these crews locate a material deposit, such as a gravel pit, they dig numerous test holes, and when there is any difference in the material in the various holes, which is usually the case, each one is sampled individually. In cases where there is overburden on a gravel deposit, this too is sampled separately. A log is drawn up of each test hole and a diagram of the deposit. These, together with all of the tests of the material from the test holes, are placed in the information to bidders so that the prospective bidders are given all the information that it has been possible to obtain. Apparently from the low-bid prices which have been received on such items as gravel base and surfacing, borrow, etc., the extra work and more money spent doing this has been well worth while.

The new equipment in the laboratory also cuts down the time of waiting for results on some materials. Steel samples, for instance, can now be broken immediately after being received and the results wired to the engineer or contractor, thus saving one day over the time previously taken before the new 200,000 pound testing machine was purchased.

Refinements and changes in testing methods are going on constantly and new apparatus must be purchased to keep the laboratory up to date. This biennium a flow table, microscope, constant temperature water bath, metallographic polishing machine, small cube testing compression machine, and other pieces of apparatus have been added.

An effort is made to keep in constant touch with the field work on construction jobs. One or more inspection trips are nearly always made on these jobs by a member of the testing department. On plant-mix jobs or any type of hard-surface paving jobs more numerous inspection trips are made and in all cases we endeavor to have a member of this department present when the paving starts in order to help design the mix.

As has been the custom in the past, such materials as structural steel, timber and vitrified pipe are tested and inspected at their source before they are shipped to the job. This work is usually done by a commercial testing laboratory.

Several research projects are being carried on at the present time, but all are dependent on long-time tests and cannot be reported in detail until carried on to completion.

An idea of the variety and number of samples tested may be obtained from the following table:

Concrete Materials—	
Cement	280
Fine concrete aggregate	208
Coarse concrete aggregate	195
Concrete test cylinders	2755
Concrete beams	112
Water for concrete	29
Concrete cores	14
Hydrated lime	4
Metals—	
Reinforcing steel	924
Structural steel	5
Castings	10
Corrugated metal pipe	939
Mesh reinforcing	8
Steel piling	3
Wrought iron	3
Copper seal and sheet copper	6
Surfacing Base and Fill Materials—	
Surfacing material	1304
Select and imported borrows	615
Retread materials	28
Crushed rock	31
Ballast	7
Binders	7
Soils—	
Physical tests	1933
Bituminous Materials—	
SC-1A	10
SC-2	975
90-95	16
95+	75
MC-2	116
RC-2	6
D grade asphalt	31
Emulsified asphalts	56
Waterproofing asphalts	36
Asphaltic joint fillers	6
Asphaltic Concrete Materials—	
Sand	11
Rock	7
Filler	5

Chemical Analyses—	
Traffic lacquer	14
Blue paint	4
Red lead	24
White paint	68
Black paint	13
Cements	20
Aluminum paint	55
Soaps	7
Water	39
Creosote	4
Soils	1320
Field Tests at Paving Plants	321
Miscellaneous Materials—	
Gravel backfill	14
Stone and masonry riprap	20
Drain tile	3
Vitrified pipe	34
Expansion joints	51
Brick	11
Asphalt plank	3
Dowel sleeves	1
Dowels	2
Filter sand	2
Redwood	3
Partition tile	7
Cinders	5
Roofing paper	1
Sewer pipe	28
Fabric for waterproofing	9
Adobe brick	11
Extraction of bituminous mixtures including grading analyses	854

BRIDGES AND GRADE SEPARATION STRUCTURES

In 1937 a system of numbering structures was started in order to have a more accurate record of them. Structures with a span of 10 feet to 20 feet, inclusive, are classed as culverts and the number is given a prefix C. Structures over 20 feet total span are classed as bridges and the number is given a prefix B. Two other prefixes have been used to indicate special structures—T for tunnel, and D for dip containing large corrugated metal pipes. This gives us a file containing a general description of each structure, with construction and maintenance inspection reports and pictures.

Through the work of the Planning Survey a number of bridges have been added to our lists which were not built by the State Highway Department, but are now included in the State Highway System. This includes many old bridges built and maintained by the counties.

Lake Street Bridge, Across the Truckee River, in Reno, is Shown Above.

Construction of bridge and grade separation structures has continued at the rapid pace set during the last biennium, as evidenced by the table showing 31 structures built during the biennium and 29 during the previous biennium. The total cost of these 31 structures, not including approaches, is $591,922. More than half, or 17, of the structures have been timber bridges. A group of these timber bridges between Las Vegas and Apex have been constructed with concrete decks. This provides a much more satisfactory surface at practically the same cost.

Of the eight concrete bridges, three are of the continuous type. Two of these, the bridge at Lake Street in Reno and the bridge over the Carson River at Towle, are of similar design with three (3) spans continuous. The Muddy River bridge, near Moapa, has five (5) continuous slab spans of 20 feet, supported by steel piles.

Two of the steel bridges are underpasses, one at Jean and one at Las Vegas. The Sierra Street bridge in Reno is a three (3) span continuous steel girder structure. The overpass at Ely has steel beams cantilevered over pier, with suspended end spans.

Several new features of design are being used. New designs call for wider bridges with a roadway 26 feet between curbs and a two- or three-foot sidewalk on each side. This wider roadway makes a safer highway and corresponds to the increase which has been made in roadway surfacing from 20 to 22 feet. Steel piles have been used on the Wells overpass, Shoshone overpass, and the Muddy River bridge, near Moapa. On the Wells overpass the fills were placed before making the abutments. The steel piles were then driven through the fills to support the small abutments. This has practically eliminated the bump which usually occurs at the end of a bridge.

Meadow Valley Wash Bridge in Clark County Carries the Traffic of U. S. Route 91.

A welded steel rail made of structural shapes has been used on the Muddy River bridge. It has a neat appearance, has more opening, is lighter weight, and costs less than the concrete rail.

More effort is being made to construct bridges with better architectural design. This may be noted from the pictures of the Lake and Sierra Street bridges in Reno, the underpass at Las Vegas, and the underpass near Jean.

In December 1937 a flood, exceeding any experienced for many years back, visited the western part of the State. The bridges over the Truckee River in Reno were tested and withstood the storm nicely. Several structures over the Carson River in the Carson Valley were damaged. The concrete bridge, B–284, near Gardnerville had one abutment undermined, tilting the north span about two feet. This was repaired by jacking the entire span with abutment into place and filling the space below the footing with concrete. Several timber bridges had approaches washed out, but little damage was done to the structures themselves.

In March 1938 a flood visited the southern part of the State causing damage to several structures. A timber bridge near Logandale had both approaches washed out, and the channel cut deeper. A dip with four 60-inch diameter corrugated metal pipes near Beatty was damaged.

As compared to our neighboring State of California and the Union Pacific Railroad, we were very fortunate in the small amount of damage done to our structures by this flood.

BRIDGES OF MORE THAN 20 FEET CLEAR SPAN AS OF JUNE 30, 1938

Structure No.	County	Location	Type of structure	Length in feet
B– 95	Churchill	Canal between Hazen and Leeteville	Reinforced concrete girder	52
B– 97	Churchill	Carson River west of Fallon	Reinforced concrete pile trestle	165
B– 98	Churchill	Truckee-Carson Canal west of Fallon	Reinforced concrete pile trestle	89
B–100	Churchill	Canal 1 mile south of Fallon	Reinforced concrete girder	43
B–105	Churchill	Eastgate	Reinforced concrete girder	55
B–240	Churchill	Between Fallon and Schurz	Timber trestle	59
B–241	Churchill	Canal 4 miles south of Fallon on Schurz road	Timber pile trestle	33
B–242	Churchill	Canal ½ mile south of Fallon on Schurz road	Timber pile trestle	52
B–244	Churchill	Truckee Canal at Lahontan	Steel I-beam, concrete deck	75
B–282	Churchill	Between Westgate and Eastgate	Reinforced concrete box culvert	23
B–288	Churchill	Between Fallon and Stillwater[3]	Reinforced concrete girder	*42
B–290	Churchill	Between Fallon and Stillwater[3]	Timber trestle	*39
B–291	Churchill	Between Fallon and Stillwater[3]	Timber trestle	*25
B–292	Churchill	Between Fallon and Stillwater[3]	Timber trestle	*40
B–293	Churchill	Between Fallon and Stillwater[3]	Reinforced concrete girder	*43
B–301	Churchill	Canal ½ mile north of Fallon	Timber pile trestle	*57
B–302	Churchill	Carson River 1 mile north of Fallon	Timber pile trestle	*78
B–345	Churchill	35 miles north of Fallon[2]	Timber truss	76
B– 64	Clark	Between Bard and Las Vegas	Timber trestle	40
B– 65	Clark	Between Bard and Las Vegas	Timber trestle	40
B– 66	Clark	Between Bard and Las Vegas	Timber trestle	40
B– 67	Clark	Between Bard and Las Vegas	Timber trestle	59
B– 72	Clark	Between Bard and Las Vegas	Timber trestle	59
B– 74	Clark	In city of Las Vegas	Reinforced concrete box culvert	22
B– 76	Clark	Las Vegas Wash near Las Vegas	Reinforced concrete box culvert	67
B– 78	Clark	4.4 miles southwest of Crystal	Reinforced concrete box culvert	44
B– 81	Clark	Muddy River near Glendale	Steel truss	166
B– 84	Clark	12 miles west of Bunkerville	Reinforced concrete box culvert	23
B– 85	Clark	Lower Virgin River at Riverside	Reinforced concrete girder	900
B– 87	Clark	Near Bunkerville	Reinforced concrete box culvert	23
B– 89	Clark	Upper Virgin River between Bunkerville and Mesquite	Reinforced concrete girder	985
B– 90	Clark	Near Mesquite	Reinforced concrete box culvert	33
B– 91	Clark	Wash at Mesquite	Reinforced concrete box culvert	48
B–192	Clark	Wash 7 miles SE. Las Vegas on Boulder City Road	Reinforced concrete box culvert	81
B–194	Clark	Wash 2 miles SE. Las Vegas on Boulder City Road	Reinforced concrete box culvert	40
B–197	Clark	Between Glendale and Logandale	Timber trestle	59
B–222	Clark	3 miles west of Boulder City	Reinforced concrete box culvert	29
B–248	Clark	Near Logandale	Timber trestle	130
B–254	Clark	Charleston Park	Timber trestle	58
B–255	Clark	Charleston Park	Timber trestle	77
B–256	Clark	Charleston Park	Timber trestle	59
B–281	Clark	Muddy River near Moapa	Concrete slab on steel piles	*114
B–313	Clark	Between Las Vegas and Apex	Reinforced concrete box culvert	*25
B–314	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*97
B–315	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*78
B–316	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*40
B–317	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*78

B-318	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*40
B-319	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*39
B-320	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*39
B-321	Clark	Between Las Vegas and Apex	Timber trestle with concrete deck	*40
B-335	Clark	23 miles southeast of Crystal[2]	Steel I-beam, timber deck	29
B-342	Clark	Boulder Dam[2]	Mass concrete	950
B-161	Douglas	3 miles south of Gardnerville	Reinforced concrete girder	27
B-169	Douglas	Carson River at Cradlebaugh	Reinforced concrete pile trestle	200
B-170	Douglas	Slough at Cradlebaugh	Reinforced concrete pile trestle	74
B-202	Douglas	Cottonwood Slough on Woodfords Road	Timber trestle	40
B-203	Douglas	Carson River on Woodfords Road	Timber trestle	97
B-204	Douglas	Fred's Fork or Home Slough on Woodfords Road	Timber trestle	40
B-205	Douglas	Hogrefe or Rocky Slough on Woodfords Road	Timber trestle	40
B-207	Douglas	West Fork of Carson River on Woodfords Road	Timber trestle	75
B-284	Douglas	Gardnerville to Centerville	Reinforced concrete girder	103
B-285	Douglas	Gardnerville to Centerville	Reinforced concrete box culvert	33
B-287	Douglas	Gardnerville to Centerville	Reinforced concrete box culvert	44
B-297	Douglas	Genoa Lane	Timber trestle	58
B-298	Douglas	Genoa Lane	Timber trestle	86
B-299	Douglas	Genoa Lane	Timber trestle	39
B-357	Douglas	Carson River on Kingsbury Grade road[2]	Timber truss	140
B-358	Douglas	Carson River on Kingsbury Grade road[2]	Timber truss	33
B-359	Douglas	Carson River on Kingsbury Grade road[2]	Timber truss	28
B-360	Douglas	Carson River on Kingsbury Grade road[2]	Timber truss	22
B-361	Douglas	Carson River on Kingsbury Grade road[2]	Timber beams	104
B- 45	Elko	Near Carlin	Concrete girder	39
B- 50	Elko	North Fork Humboldt River near Halleck	Steel I-beam, concrete deck	44
B- 54	Elko	Mary's River near Deeth	Reinforced concrete girder	44
B- 55	Elko	Humboldt River near Deeth	Steel truss	75
B-230	Elko	Thousand Springs Creek north of Wells	Reinforced concrete girder	35
B-231	Elko	Little Salmon River near Contact	Timber pile trestle	87
B-232	Elko	Little Salmon River near State line	Reinforced concrete girder	83
B-233	Elko	Fifth Street in Elko	Reinforced concrete girder	121
B-346	Elko	Humboldt River near Halleck[2]	Timber truss	48
B-347	Elko	Humboldt River near Halleck[2]	Timber truss	80
B-348	Elko	South Fork Owyhee River east of Tuscarora[2]	Steel I-beam, timber floor	23
B-349	Elko	South Fork Owyhee River north of Tuscarora[2]	Steel I-beam, timber floor	27
B-350	Elko	Owyhee River near Owyhee[2]	Steel I-beam, timber floor	36
B-351	Elko	Owyhee River near Mountain City[2]	Timber	40
B-352	Elko	North Fork Humboldt River near North Fork[2]	Steel I-beam	22
B-353	Elko	Smith Creek near Jiggs[2]	Timber	22
B-354	Elko	Smith Creek south of Jiggs[2]	Steel I-beam	38
B-355	Elko	South Fork Humboldt River south of Jiggs[2]	Timber truss	30
B-356	Elko	South Fork Humboldt River south of Jiggs[2]	Timber beam	26
B-137	Esmeralda	Near Coaldale	Reinforced concrete box culvert	32
B-200	Esmeralda	Between Basalt and Coaldale	Timber trestle	112
B- 37	Eureka	Humboldt River at Dunphy	Steel truss	126
B- 39	Eureka	Canal at Dunphy	Reinforced concrete box culvert	27
B-113	Eureka	East of Lander-Eureka County line	Reinforced concrete box culvert	23
B-283	Eureka	Approach road at Dunphy[3]	Timber trestle	36
B-365	Eureka	Humboldt River near Beowawe[2]	Steel truss	100

BRIDGES OF MORE THAN 20 FEET CLEAR SPAN AS OF JUNE 30, 1938—*Continued*

Structure No.	County	Location	Type of structure	Length in feet
B–366	Eureka	8 miles northwest of Eureka[2]	Timber	22
B–367	Eureka	Humboldt River near Palisade[2]	Timber	118
B–223	Humboldt	Humboldt River at Winnemucca	Steel I-beam, concrete deck and piers	190
B–226	Humboldt	Quinn River near Nevada-Oregon State line	Reinforced concrete box culvert	29
B–362	Humboldt	Humboldt River near Golconda[2]	Timber	58
B–363	Humboldt	Between Paradise Hill and Quinn River Crossing[2]	Timber	22
B–364	Humboldt	Quinn River near Quinn River Crossing[2]	Timber	38
B– 33	Lander	Reese River east of Battle Mountain	Reinforced concrete box culvert	26
B– 34	Lander	Reese River east of Battle Mountain	Reinforced concrete box culvert	26
B–108	Lander	Reese River between Railroad Pass and Austin	Timber pile trestle	62
B–109	Lander	Reese River between Railroad Pass and Austin	Timber pile trestle	52
B–112	Lander	3 miles west of Lander-Eureka County line	Reinforced concrete box culvert	34
B–325	Lander	Reese River south of Battle Mountain	Timber trestle	*41
B–213	Lincoln	Between Junction Alamo-Delamar Road and Caliente	Timber trestle	32
B–214	Lincoln	Between Junction Alamo-Delamar Road and Caliente	Timber trestle	47
B–215	Lincoln	Between Junction Alamo-Delamar Road and Caliente	Timber trestle	47
B–216	Lincoln	Between Junction Alamo-Delamar Road and Caliente	Timber trestle	47
B–217	Lincoln	Between Junction Alamo-Delamar Road and Caliente	Timber trestle	32
B–218	Lincoln	Between Junction Alamo-Delamar Road and Caliente	Timber trestle	32
B–219	Lincoln	Meadow Valley Wash west of Caliente	Steel truss	164
B–220	Lincoln	Meadow Valley Wash north of Caliente	Steel I-beam, concrete piers and abutments	102
B–250	Lincoln	Canal east of Panaca	Timber trestle	88
B–275	Lincoln	Meadow Valley Wash west of Panaca[4]	Timber trestle	27
B–276	Lincoln	Meadow Valley Wash west of Panaca[2] [1]	Timber trestle	26
B–305	Lincoln	Between Caliente and Panaca	Timber trestle	*98
B–306	Lincoln	Between Caliente and Panaca	Timber trestle	*94
B–312	Lincoln	Between Caliente and Panaca	Timber trestle	*40
B–144	Lyon	East Walker River south of Yerington	Reinforced concrete girder	65
B–145	Lyon	Slough at Wilson Canyon	Reinforced concrete girder	27
B–146	Lyon	West Walker River at Wilson Canyon	Reinforced concrete girder	55
B–147	Lyon	West Walker River at Wilson Canyon	Reinforced concrete box culvert	22
B–149	Lyon	West Walker River at Bulkhead	Reinforced concrete arch	80
B–158	Lyon	West Walker River at Hoye	Reinforced concrete girder	63
B–159	Lyon	Simpson Canal near Wellington	Reinforced concrete girder	44
B–238	Lyon	Truckee Canal near Fernley	Steel truss	59
B–245	Lyon	Walker River 1 mile west of Yerington[2]	Steel I-beam	78
B–247	Lyon	Carson River at Towle Ranch[2] [1]	Steel truss	102
B–333	Lyon	Carson River at Towle Ranch	Continuous concrete girder	*153
B–375	Lyon	Between Dayton and Silver City[2]	Timber	30
B–376	Lyon	1 mile southeast of Wellington[2]	Concrete arch	26
B–140	Mineral	Between Dutch Creek and Schurz	Reinforced concrete box culvert	27
B–239	Mineral	Walker River near Schurz	Timber pile trestle	97
B–180	Nye	East of Tonopah	Reinforced concrete box culvert	47
B–268	Nye	30 miles east of Tonopah	Reinforced concrete box culvert	*32
B– 28	Pershing	Humboldt River near Lovelock	Reinforced concrete pile trestle	146
B– 1	Washoe	Truckee river west of Verdi	Reinforced concrete arch	194
B– 2	Washoe	Truckee Canal near Verdi	Steel plate girder	75

B– 3	Washoe	Truckee River east of Verdi	Reinforced concrete arch	141
B– 4	Washoe	Highland Canal near Mogul	Reinforced concrete girder	52
B– 16	Washoe	Truckee River near Wadsworth	Reinforced concrete girder	268
B–177	Washoe	Evans Creek south of Reno	Reinforced concrete arch	35
B–178	Washoe	Truckee River, Virginia Street, Reno[2]	Reinforced concrete arch	146
B–234	Washoe	Steamboat Creek near Steamboat	Timber beams on steel bents	30
B–260	Washoe	Alameda Avenue, Reno[3]	Steel I-beam, concrete piers	190
B–303	Washoe	Sierra Street, Reno[3]	Continuous steel girders	*136
B–304	Washoe	Lake Street, Reno[3]	Continuous reinforced concrete girder	*153
B–334	Washoe	At Incline	Reinforced concrete box culvert	23
B–336	Washoe and Storey	Truckee River on Route 45 east of Sparks[2]	Timber truss	126
B–337	Washoe	7 miles north of Nixon[2]	Timber truss	23
B–338	Washoe	25 miles north of Gerlach[2]	Timber truss	34
B–339	Washoe	32 miles north of Gerlach[2]	Timber truss	28
B–340	Washoe	34 miles north of Gerlach[2]	Timber truss	28
B–341	Washoe	36 miles north of Gerlach[2]	Timber truss	34
B–377	Washoe	Truckee River near Nixon[2]	Steel I-beam timber deck	*166
B–185	White Pine	White River, 30 miles southwest of Ely	Timber trestle	39
B–328	White Pine	East foot of Connors Pass	Reinforced concrete box culvert	*25

*Constructed during biennium.

[1] Abandoned during biennium due to relocation.

[2] Not built by State Highway Department.

[3] On feeder roads; not State Highway System.

[4] Rebuilt during biennium.

GRADE SEPARATION STRUCTURES ON NEVADA STATE HIGHWAY SYSTEM AS OF JUNE 30, 1938

Structure No.	County	Location	Type of structure	Length in feet
B– 60	Clark	Overpass near Jean[1]	Steel I-beam, concrete girder approach spans	104
B– 77	Clark	Underpass at Apex	Steel I-beam, concrete abutments	58
B– 79	Clark	Underpass at Crystal	Steel I-beam, concrete abutments	72
B–195	Clark	Underpass in Las Vegas	Steel I-beam, concrete abutments	*820
B–208	Clark	Overpass at Moapa	Steel I-beam, concrete girder approach spans	122
B–322	Clark	Underpass near Jean	Steel girders, concrete abutments	*64
B– 52	Elko	Southern Pacific overpass at Deeth	Steel I-beam, concrete piers and abutments	130
B– 53	Elko	Western Pacific overpass at Deeth	Steel I-beam, concrete girder approach spans	129
B– 56	Elko	Overpass west of Wells[1]	Timber trestle	90
B– 57	Elko	Underpass west of Wells	Steel I-beam, concrete abutments	100
B– 58	Elko	Overpass at Silverzone	Steel I-beam, concrete girder approach spans	135
B– 59	Elko	Underpass at Silverzone	Steel I-beam, concrete abutments	76
B–132	Elko	Overpass at Wendover	Steel I-beam, concrete girder approach spans	134
B–229	Elko	Overpass east of Wells	Steel I-beam, concrete girder approach spans	155
B–323	Elko	Western Pacific overpass west of Wells	Steel I-beam, concrete girder approach spans	*116
B– 35	Eureka	Overpass at Shoshone	Steel I-beam, concrete piers and abutments	136
B– 38	Eureka	Overpass at Dunphy	Steel I-beam, concrete girder approach spans	163
B–324	Eureka	Overpass at Shoshone	Steel I-beam, concrete girder approach spans	†220
B– 30	Humboldt	Overpass at Rose Creek	Steel I-beam, concrete piers and abutments	130
B– 31	Humboldt	Underpass at Winnemucca	Steel I-beam, concrete abutments	107
B–224	Humboldt	Winnemucca overpass	Steel I-beam, concrete girder approach spans	195
B–261	Lincoln	Underpass at Pioche[2]	Steel girder and steel bents	20
B– 18	Lyon	Underpass west of Fernley	Steel I-beam, concrete abutments	112
B– 19	Lyon	Overpass east of Fernley	Steel I-beam, concrete girder approach spans	154
B–133	Nye	Underpass at Tonopah[2]	Timber trestle	23
B– 29	Pershing	Overpass at Woolsey	Steel I-beam, concrete girder approach spans	174
B–235	Storey	Virginia City overpass	Steel I-beam, steel bents	72
B–258	Washoe	Second Street underpass, Reno[3]	Steel girder, concrete abutments	75
B–259	Washoe	Alameda underpass, Reno[3]	Steel I-beam, concrete abutments	71
B–125	White Pine	Overpass west of Ely	Steel I-beam, concrete piers and abutments	73
B–130	White Pine	Underpass at McGill[2]	Steel I-beam, steel piers	12
B–371	White Pine	Overpass west of Ely	Steel I-beam, steel and concrete piers	†243

*Constructed during biennium. †Under construction as of June 30, 1938. [1] Abandoned during biennium due to relocation.
[2] Not built by State Highway Department. [3] On feeder roads ; not State Highway System.

BRIDGE AND GRADE SEPARATION SUMMARY

	STRUCTURES BUILT BY STATE HIGHWAY DEPARTMENT						
	Completed or under construction as of June 30, 1936	Completed during biennium or under construction at close of biennium, June 30, 1938	Total	Structures on State Highway System not built by State Highway Department	Total structures on State Highway System	Structures abandoned during biennium	Total structures as of June 30, 1938
Mass concrete	0	0	0	1	1	0	1
Reinforced concrete	52	8	60	2	62	0	62
Structural steel	23	4	27	12	39	1	38
Timber bridges and trestles	38	17	55	26	81	2	79
Composite structures (reinforced concrete and structural steel)	11	2	13	0	13	1	12
Total	124	31	155	41	196	4	192
Total length of structures in feet	11,289	3,149	14,438	2,906	17,344	322	17,022

A View from Thorp Point, a Part of the Roadside Improvement Project at Geiger Lookout, Nevada Route 17.

ROADSIDE DEVELOPMENT

H. H. Swinburne, *Landscape Architect*

The landscape development of our roadsides has definitely passed out of the stage generally known as "beautification." The public is beginning to understand that roadside development, as a functional part of its surroundings, is not a problem of artificial beautification, but one of natural improvement within the highway right of way.

Beauty and aesthetic appeal are of importance, but they are not applied after the highway is completed. They are actually incorporated in the project from the time the first reconnaissance survey is made. Beauty is always considered during all stages of design and construction, and subsequent planting is merely the final completion of the framework formed by engineering and architectural necessities.

Calling Attention to the Landscaping Project Near Winnemucca, Humboldt County.

Several factors influence the type of roadside project chosen for development. Volume and type of traffic affect the kind of project to be used, whether it be the development of a rustic lookout station giving a panorama of the landscape on a road carrying heavy tourist traffic, or the formal planting of an avenue of trees at the approach to a city. Annual maintenance is a factor always under consideration, and projects requiring more than nominal maintenance after two years are not looked upon favorably. Safety to the traveling public is never forgotten. If the planting of certain trees would obscure vision or create a hazard, a different type of development is used. Unless deceleration lanes or turnouts are feasible, projects requiring slow speed approaches are not used on high speed roads.

Until recently there has been only the objective of reaching some city or town as the fixed destination. We have been largely concerned with the speed and facility of reaching that destination, but with the increasing tourist demand for pleasure routes of scenic value, there now arises the necessity of stopping at focal points of interest to fully appreciate these areas of rest, recreation and enjoyment. Such a project has been developed along the historic Geiger Grade on State Route 17 between Reno and Virginia City. The public has been enthusiastic in its response to this improvement. (An illustration accompanies this article.)

Dedicated to the original road builder, Geiger lookout is an outstanding example of a project serving both tourist and community interests. The site affords an extended view of the country side, and is amply provided with picnic and rest facilities. This project has proven so successful that an even more elaborate development is being planned just west of Verdi, on Route U S 40, to serve transcontinental traffic and should be completed during 1939.

Entrance of Geiger Lookout, a Roadside Improvement Project on Geiger Grade.

Examples of intensive planting developments can be seen in Lovelock and Winnemucca, where avenue planting of Chinese and Siberian elm trees will give a formal approach to these cities, and in a few years provide interesting patterns of light and shade.

The Alameda Avenue underpass in Reno has been successfully treated with evergreens and shrubbery, and during the spring of 1939 the Winnemucca bridge and overpass at the northern end of that city will be similarly planted. These projects will demonstrate the use of landscaping in solving problems of erosion as well as beautifying the structures themselves.

The fundamental principle back of all planning and all design is to provide something for human use and enjoyment. Roadside development contributes utility as well as beauty in fulfilling its functions as one of the phases of highway design.

This Shelter House, in the Valley of Fire State Park, in Clark County Was Built of Varicolored Native Stone.

PUBLICITY

F. G. Greulich, *Publicity Director*

The publicity section of the Department of Highways has made material progress during the past biennium. The most important product of this section was the issuance of the bimonthly publication Nevada Highways and Parks. Completing the third year of its publication it has been received with great favor, not only from citizens within the State, but interested persons in other States. From an initial press run of 2,500 copies, distribution of the magazine has been gradually increased until at the close of the year 1937 the average number of copies distributed was 15,000 for each issue. During 1938 this number was again increased until at the present time the bimonthly press run averages 20,000. Since the publication made its first appearance in January 1936, up to and including the July-August 1938 number, a total of 200,500 copies have gone out to tell the world of the better things found in Nevada. Of this printing less than 50 of any or all of the back numbers are now available.

Through the wide distribution of this material promoting the welfare of the State the Department of Highways feels it has diffused a wider and more favorable knowledge about Nevada to the people living outside our own boundaries. It is also reasonable to state that this publication has been materially helpful in increasing annually tourist and motor travel within our State. Circulation of the magazine is made to public libraries, automobile service clubs, civic clubs, universities, tourist agencies, schools, school teachers, automotive garages and service stations, and to individuals. Approximately 90 percent of the circulation is made in other States than Nevada. The magazine has copies going to all sections of the Nation, and a considerable number to foreign countries.

Because of limited mechanical printing facilities which exist at the present time the circulation figures have been temporarily steadied. With added facilities promised for the State Printery, the bimonthly press runs can be rapidly increased to as high a figure as 50,000 or more copies per issue.

The publicity section still serves the State press, as well as the representatives of the National Press Associations within the State, with news releases. These releases are sent out on an average of two or three weekly.

Many feature articles have been formulated and sent to magazines of various classifications. Technical magazines interested in highway construction and highway construction methods have received many such feature articles. These magazines, located in the Pacific Coast region, the Middle West section, the South, and in the New York area, have large circulations. All phases of highway construction within the State of Nevada have been treated and forwarded to these periodicals, frequently upon special request, otherwise by solicitation of the personnel of the publicity section.

From many letters of commendation received from the various magazines and papers so served, the contributions mailed to them have been well received and in all cases the articles were used and published.

The publicity section was also directly responsible for the publication of articles in several popular periodicals, having tremendous Nation-wide circulation, during the past biennium. The Saturday Evening Post, through the aid of the Highway Department, published a very favorable article concerning the new copper discovery at Rio Tinto in Elko County. This magazine has a circulation considerably over 2,000,000 copies weekly. The Saturday Evening Post also printed pictures of this camp. These photographs were obtained by members of the department's personnel.

Another feature article published in a nationally circulating magazine, having distribution of nearly 2,000,000 monthly, was an article written about Nevada used in the American Magazine, under the by-line of J. B. Griswold. The writer of this article was helped substantially by the publicity section and gave Nevada some very favorable publicity. It might be in order to say that it was not of the sordid or perverted type, and presented conditions in Nevada in a more truthful light.

Many photographs have been sent out by this section to educational magazines, trade publications, service club organs, automobile association monthly magazines, tour guides, and to associations using these prints as part of educational textbooks and publications.

During the year 1937 and for the first six months of 1938, more than 50,000 State highway maps were distributed to all parts of the Nation. Requests for this kind of literature came in increasing numbers during the biennium, more particularly during the first months of the calendar year. During the first five months of 1938 an average of approximately 450 pieces of mail came to the publicity section each month, asking for maps, information and literature about the scenic, historical, and commercial advantages, as well as inquiries concerning routes to various places and condition of highways.

To take care of this demand for literature a brief historical booklet relating to Nevada entitled "Nevada, Yesterday and Today" was issued during the early months of 1938. To date nearly 10,000 copies of this booklet have been distributed, and it will be necessary to go into a third printing in the near future to supply the demand.

An information desk was also set up in the publicity section at department headquarters. Inquiries concerning road conditions, places of historic and scenic interest, tourist camp facilities, and routings into other States have come by telephone and by personal contact. The number of persons availing themselves of this service is constantly increasing. It is the policy of the officials of the department to give every courtesy and consideration to such inquiries. As an evidence of its favorable reception many letters of thanks and appreciation have been received from parties visiting the State who have been thus served.

During the spring and summer vacation and touring season these requests became numerous and in all cases available information was given to those making inquiry. It has been the means of building up a good-will factor for the State, as well as the department, and increasing dependence is being placed upon the directions given out at the information desk.

To meet the obvious need for distributing a circular at regular intervals detailing road conditions and road construction reports, the department inaugurated a biweekly service of this character. Road conditions, detour conditions, and notice where construction is in progress are included in this mimeographed letter. They are sent to approximately 2,000 individuals, service stations, oil companies, and persons or organizations dealing with tourist trade and tourist problems. These reports more specifically have been confined to the territory immediately adjacent to the State. A list of names obtained through the cooperation of oil distributing concerns puts this road condition report into the hands of service station operators, automobile club agencies, oil company agents, hotels, and individuals in all of the States immediately surrounding the State of Nevada. While the distribution of these road condition reports is not strictly confined to these localities, the greater number of the copies are so directed. Other copies go to the eastern tourist agencies, hotels, and oil companies who have made special request for them. The issuance of these mimeographed sheets each two weeks gives accurate and dependable information about construction work in progress, and condition and length of detour. This service, obviously, has been of great benefit in providing prospective tourists to our State with such information before they reach our boundary lines. The Highway Department, however, does not discriminate between routes, and very definitely informs the recipients of such information that it is their pleasure in making their own selection of routes. The department personnel simply gives the facts.

In addition to the above duties assigned to this section of the department's activities, hundreds of letters seeking comprehensive information on specific subjects have been received. A great many of these require research to obtain the required material, but in all cases the information was secured and forwarded.

Several articles have been formulated for radio broadcasting. This material likewise relates to the historic, scenic, recreational, and commercial advantages of Nevada.

Cooperation from civic and commercial organizations throughout the State and citizens individually has been whole-hearted. Many individuals and firms have supplied photographs and data which was used to formulate articles and published in the Nevada Highways and Parks magazine. Lodges, fraternal orders, and civic clubs have aided in the distribution of many copies of literature and brochures of information composed and published by the publicity section of the department.

Where regional or national conventions of such organizations are held, and delegations from Nevada express their intention to attend, nearly always such delegations gladly make distribution of Nevada literature obtained from the Highway Department. Reports from delegates of such organizations show that the pamphlets and brochures have been well received and with much interest. This distribution has also tended to create, not only good will toward the State, but it has helped very materially to establish a more friendly and intelligent knowledge of the citizens, and of the many fine things found in the State of Nevada.

LABOR STATISTICS

GEORGE FOLEY, *Labor Statistician*
J. I. PETERSON, *Assistant*

The biennium July 1, 1936–June 30, 1938, witnessed the abandonment of most of the special provisions relating to labor. In the year 1936 the last funds available under the Emergency Relief Appropriation Act of 1935 were expended, with the exception of a few thousand dollars. This sum was absorbed early in the year 1938. Since then all highway construction has been carried on with Federal aid and Federal lands appropriations, and with State participation, and provisions concerning labor reverted to more normal standards.

Whereas, under the alternate plan of 1935–1936, Nevada exceeded by approximately 1,750,000 its quota of man-hours of work performed by employees taken from the Federal relief rolls during the biennium under consideration. This class of labor proved entirely inadequate numerically to supply any considerable proportion of highway requirements. Due to relatively favorable economic conditions in Nevada, relief workers had been largely absorbed into private industries and occupations.

Contractors were obliged to procure only unskilled workmen from the National Reemployment Agencies. However, this service apparently proved of such value that the contractors generally obtained from them workmen in all grades (supervisory, skilled, intermediate, and unskilled), often relying on this source for all labor supplies.

Previous regulations designed to disseminate widely the benefits of the highway program by limiting working hours to 130 per month for each individual were discontinued. Forty and forty-eight hours per week per man became the rule. Minimum wage rates continued in effect.

Pay roll supervision was confined principally to ensuring proper payment without unauthorized deductions, and became chiefly a matter of record and for checking in cases involving claims under the State industrial compensation provisions. Proper delegation of authority by contractors to their agents in pay roll matters continued to be required in the form of an affidavit. Pay roll forms, considerably less comprehensive and detailed than those formerly distributed by the State, were furnished the contractors by the Federal Government.

There are given below the average number of workmen employed, the man-hours of work performed per week, and the total number of man-hours in highway construction during the biennium.

Weekly average: Men, 672; man-hours, 25,094. The total number of man-hours consumed during biennium, 2,609,776.

EQUIPMENT

W. S. Holesworth, *Equipment Superintendent*

The equipment division, since the last biennial report, has been unusually busy due in part to the severity of the winters of 1936–1937 and 1937–1938. Snow removal equipment worked in many instances on 24-hour shifts. Required repairs to the equipment thus used were correspondingly heavy.

The equipment division has carried on the profitable disposal of obsolete equipment begun during the last biennium. As a result the equipment of the State Highway Department at present is composed of modern and efficient maintenance units. Also, in the purchase of its new units the equipment division has continued the policy of purchasing the new unit in that part of the State, whenever possible, where the equipment is to be used.

The Department's Striping Machine Puts the Safety Stripe on the Highways Rapidly and Economically.

The ever-lengthening mileage of hard-surfaced highways in our State is now making obsolete the maintainers and graders of the Department, and when such occasion arises an effort is made to sell them to the different county governments.

The construction of plant buildings started during the last biennium has been completed. Completion of a wing to the machine shop, started in May 1938 and completed the following month, gives the Reno plant modern facilities for the efficient handling of repairs and maintenance work.

The striping machine which was designed and constructed at the Reno plant has proven a great success. Its work will continue to benefit the State more and more each year. Comparative costs per mile for striping show that with the new machine Nevada's striping costs are considerably less than in other States.

During the past fiscal year construction of three house trailers of a new type were made available for the use of survey parties in the field. These will be used as bunk houses and cookhouse. These new trailers were constructed to give comfort and convenience for those who occupy them. They are modern in every respect, sanitary, fireproof and easily maneuverable. The type of trailers heretofore constructed were of wood, mounted on obsolete solid tired chassis. They were cumbersome and towable at only seven miles per hour. Actual tests have shown that the new type trailers can be towed safely at 40 miles per hour. This favorable factor affords movement from one job to another in a matter of hours instead of days.

Striping Machine Shown in Action While Painting the Safety Line.

The bunkhouse trailers accommodate four men and affords the occupants some measure of the comforts of home during their stay on the job. Sometimes the project site is located many miles from any town.

Two new Sno Gos were added to the four purchased during the previous year. These six powerful machines have proven their worth in helping keep the highways open during the heavy snows of the past two winter seasons.

Fire destroyed the East Ely shop on February 2, 1938, fortunately with no loss of life. Property damage to the shop, contents, and equipment was fully covered by insurance.

The cost of the three trailer units constructed at the Reno plant during the past year amounted to $3,524.46.

During the past biennium the equipment division has purchased 155 units at a cost of $318,431.71.

SAFETY DIVISION

B. C. Hartung, *Director Division of Safety*

The State of Nevada, Department of Highways, began its safety program in January 1936, at which time a campaign was started among the 600 employees of the department itself. It was believed an example set by such a large State group would have a beneficial effect on the other residents of the State.

The State Highway Engineer sanctioned this program among the highway employees and also suggested rewards for those divisions or departments keeping themselves free of accidents over a specified period.

In order to be fully versed on current safety measures, the department established an affiliation with the National Safety Council of Chicago, Illinois. That organization immediately transmitted a large supply of pamphlets, instructional bulletins, etc., for the guidance of the highway employees. The interest in what the Highway Department was doing in safety gradually spread to the various communities, and by the close of the year many inquiries were received regarding the possibilities of establishing local safety campaigns. As an added incentive to this rising community interest, the department, in cooperation with the American Red Cross, set up a series of first-aid instruction courses at all of the larger maintenance units in the northern section of the State. This later spread into the eastern and western divisions, and finally into the far southern counties. Results were that some 200 foremen and assistants, by the close of the spring months of 1938, had completed the prescribed course and thus prepared themselves to give assistance on roadside emergencies arising in the field.

Observing the value of safety work in schools, the department initiated a program whereby instruction, illustrated posters, and bulletins were directed to all districts. The chief motive in this respect was to impress both the students and the teachers with the importance of developing a "safety consciousness" on the part of the children. Cooperation received from these districts was more than encouraging, and a great deal of aid was rendered through the office of the Superintendent of Public Instruction, in Carson City.

In the spring of 1937, through the courtesy of the National Bureau of Surety and Casualty Underwriters, the department issued 10,000 pamphlets entitled "Creating Safer Communities." These publications contained the fundamental rules of safety organization work. Upon being sent to the various communities it was found that an even greater interest had been stimulated in highway safety.

By the summer of 1937 it was discovered that the safety program had reached such dimensions as to require a separate division within the Highway Department. Bernard C. Hartung, who had been carrying on this work from the start, was placed in charge and given a small office personnel. Immediately following this move a more intensive field program was instituted, and during the fall of the year no less than ten State trips were made in the effort to further promote interest in the campaign. Visual education and instructive talks were the keynotes of these field trips, and no less than 15,000 persons, including most of the school children of the State, viewed the safety films and listened to the talks on this important subject.

By this time Governor Kirman, who had been keenly interested in safety from the start, had set up the Governor's Safety Committee, and this group cooperated with the Highway Department in developing interest in the various towns.

Realizing that the problem must be solved by the towns and communities themselves, the department set upon a campaign to organize city and county committees. The results showed that by June 1938 there were some 12 active committees in Nevada. The Division of Safety of the Highway Department keeps in constant touch with these committees and encourages them to sponsor safety observance in their individual districts.

Guard Rails Afford a Safety Factor on the Fernley Overpass.

A reward for the work which the State had done in the furtherance of highway and roadway safety was received from Washington, D. C., on April 12 at which time Nevada was presented with the National Safety Council award in the form of a bronze plaque for the furtherest advance in Highway Safety among the 11 western States for the year 1937. By virtue of winning this award the State automatically was entitled to two graduate scholarships. One including a course in Traffic Engineering at Yale University, and the other a Police Training Course at Northwestern University.

For the first six months of 1938, and despite the record established last year, Nevada was able to reduce its automobile fatalities by 17%; this according to figures released by the National Safety Council. It is hoped that this improvement will advance even further during the remainder of the year and eventually to that point where the motor car accident problem is entirely under control. The department feels that the following points in its program have been largely responsible for the results achieved so far:

1. The education of the motor car driver as to the dangers and responsibilities under his control, and the response on the part of residents of this State to the point where "Safety Consciousness" is a popular achievement.

2. A comprehensive system of accident reporting as approved by the U. S. Bureau of Public Roads, and participated in by not only highway employees themselves, but also Chiefs of Police, Sheriffs, and other officials throughout the State. This item leads up to one of the most important features of safety advancement; that is, *adequate enforcement,* and local officials in most sections of the State have made it their purpose to apprehend willful traffic violators.

3. The sympathetic support and cooperation of the Highway Department itself to the end that safety devices everywhere are being built into the roadways of Nevada.

4. Education of the school children who, in most instances, have proven themselves readily responsive to the promotion and continuance of the safety movement.

5. Lastly, the enlistment of the interest and support of service organizations, parent-teacher groups, and finally the local safety committees themselves, in the value and importance of safety work.

The illustrations show what has been accomplished from the engineering standpoint. Included under this item are the building of grade crossing separations, center striping of highways, and in every other manner possible making it easier and safer for the driver to travel over Nevada's splendid system of roads.

MAINTENANCE

RICHARD SHEEHY, *Maintenance Engineer*
M. E. NORTON, *Accountant*

"Highway maintenance is the preserving and keeping of each type of roadway, roadside, structure, and facility as nearly as possible in its original condition as constructed or as subsequently improved, and the operation of highway facilities and services to provide satisfactory and safe highway transportation."

For highway administrative purposes the State of Nevada is divided into five divisions with a division engineer assigned to each division. The maintenance engineer cooperating with the division engineers are responsible for the proper maintenance of all roads on the maintenance system.

Sno-Gos Are Used for Removal of Snows on Nevada's Highways During and After Storm Periods.

Practically all of the improved roads on the State Highway System have been constructed with the help of Federal aid funds. Under the set-up with the United States Bureau of Public Roads the State of Nevada is required to maintain these roads to conform with Government standards.

Revenue for highway maintenance is provided for through the State gasoline tax law, and nearly all gas tax receipts are absorbed annually. The maintenance budget for the next fiscal year is prepared in June of each year.

Funds are provided in this budget for general maintenance operations such as routine roadway surface operations, special roadway surface operations, shoulders and side approaches, roadside drainage, traffic services, snow, ice and sand control, structures, and maintenance general expense. No definite amounts can be set up in the budget for snow removal and extraordinary maintenance due to floods or cloudbursts. In order to meet these contingencies an emergency reserve fund has been set up to take care of such work.

As additional mileage of improved roads is added to the highway system, with a corresponding increase in motor traffic, the snow removal problem becomes more acute each year. In order that the primary routes, as well as the more heavily traveled secondary roads, may be kept clear of snow and open to travel throughout the winter season, extra labor, in addition to the regular maintenance crews, is required. It also becomes necessary to purchase additional snow fighting equipment.

During the winter season of 1937 the Department of Highways spent $131,066.03 in its work of keeping the highways open to travel.

During the past biennium the placing of U. S. and State route markers, mileage, and directional signs was completed. In order to maintain these signs it was found necessary to employ a regular sign crew and a sign painter.

At the close of the fiscal year ending June 30, 1938, there were 2,770.20 miles of highway being maintained; while at the end of the previous biennium, June 30, 1938, 2,656.68 miles were maintained. This shows the maintenance department had added 113.52 miles to its work, as noted in the following table:

MAINTENANCE MILEAGE

Types	June 30, 1936	June 30, 1938	Increase or decrease
Cement concrete	30.26	26.76	—3.50
Asphaltic concrete	35.79	39.40	+3.61
Plantmixed bituminous-treated surface	72.77	117.59	+44.82
Roadmixed bituminous-treated surface	1,753.38	2,159.12	+405.74
Gravel	562.89	230.42	—332.47
Graded and unimproved	201.59	196.91	—4.68
	2,656.68	2,770.20	+113.52

MAINTENANCE COSTS FROM 1918 TO 1938

1918	$16,596.54	1928	$359,262.08
1919	29,330.21	1929	418,065.08
1920	44,323.34	1930	500,752.46
1921	33,601.26	1931*	301,166.64
1922	61,997.55	1932	618,377.41
1923	110,724.87	1933	566,845.41
1924	122,788.60	1934	502,715.66
1925	215,168.70	1935	617,784.47
1926	306,899.52	1936	675,726.06
1927	343,399.28	1937	846,033.35
		1938	756,305.26

*Seven months' expenditures, December 1, 1930, to June 30, 1931. Starting during the fiscal year 1933 and continuing through 1934, the maintenance crews worked and were paid for five days a week only.

SNOW REMOVAL COSTS, 1923*–1938

1923	$12,695.38	1931	$4,711.45
1924	884.53	1932	83,632.96
1925	1,479.13	1933	83,497.61
1926	1,803.43	1934	8,227.13
1927	8,228.95	1935	28,573.76
1928	3,167.50	1936	50,948.37
1929	16,172.05	1937	131,066.03
1930	19,466.28	1938	59,468.88

*Snow removal costs prior to 1923 not available.

MAINTENANCE REPORT FOR THE FISCAL YEAR JULY 1, 1936, TO JUNE 30, 1937

During the State's fiscal year ending June 30, 1937, the Department of Highways spent $846,033.35 for maintaining 2,697.82 miles of road. The total mileage includes improved and unimproved types of road and the total cost includes all direct and indirect charges to maintenance.

MAINTENANCE MILEAGE AND EXPENDITURES BY ROAD TYPE, FISCAL YEAR 1937

Type of road or construction	Mileage	Expenditures
Cement concrete	25.88	$18,013.90
Asphaltic concrete	40.66	35,690.48
Plantmixed bituminous-treated gravel	89.01	43,394.64
Roadmixed bituminous-treated gravel	1,973.99	558,337.07
Gravel	362.68	78,013.66
Graded and unimproved	205.60	34,299.55
Bridge maintenance	----------	4,301.37
*Additions and betterments	----------	73,982.68
	2,697.82	$846,033.35

*Comprising the following items:

Construction and repair maintenance stations	$51,427.02
Construction of new fence along right of way	3,240.29
Erection of new signs and markers	8,911.05
New riprap and scaling slopes	4,835.66
New timber bridges	1,503.73
Cooperative maintenance on Buckhorn Mine road	531.77
Widening shoulders Esmeralda 3–C–2	3,533.16
	$73,982.68

MAINTENANCE COST PER MILE BY ROAD TYPE, FISCAL YEAR 1937

Type of surface	Mileage	Cost	Cost per mile
Cement concrete	25.88	$18,013.90	$696.06
Asphaltic concrete	40.66	35,690.48	877.78
Plantmixed bituminous-treated gravel	89.01	43,394.64	487.53
Roadmixed bituminous-treated gravel	1,973.99	558,337.07	282.85
Gravel	362.68	78,013.66	215.10
Graded and unimproved	205.60	34,299.55	166.83
	2,697.82	$767,749.30	$284.58

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON CEMENT CONCRETE, ASPHALTIC CONCRETE, AND PLANTMIX BITUMINOUS-TREATED GRAVEL ROADS, FISCAL YEAR 1937

Operation	Cement concrete	Percent	Asphaltic concrete	Percent	Plantmix	Per-cent
Building and repairing shoulders	$3,846.42	21.4	$5,450.55	15.3	$5,076.18	11.7
Filling expansion joints and cracks and patching surface	1,717.41	9.6	5,277.33	14.8	6,061.98	14.0
Cleaning ditches and culverts	1,752.78	9.7	1,762.73	4.9	3,182.48	7.3
Cutting weeds and brush	564.38	3.1	1,605.47	4.5	3,803.70	8.8
Repairing and cleaning surface ditches	-------	-------	15.06	-------	122.98	.3
Erecting and repairing signs and markers	898.35	5.0	1,213.09	3.4	2,043.94	4.7
Removing slides and trimming slopes	1,443.68	8.0	1,323.24	3.7	2,774.50	6.4
Repairing washouts	737.06	4.1	1,208.07	3.4	2,294.51	5.3
Removing snow	2,213.13	12.3	9,239.45	25.9	4,578.11	10.6
Repairing guard rail	349.61	2.0	308.48	.9	698.16	1.6
Protecting slopes and riprapping	140.85	.8	52.57	.1	1,051.64	2.4
Removing debris and waste material along right of way	222.37	1.2	89.71	.3	548.80	1.3
Repairing culverts	113.68	.6	31.40	.1	736.37	1.7
Reconditioning	-------	-------	768.51	2.2	1,486.57	3.4
Repairing fences and gates on right of way	77.62	.4	692.81	1.9	159.07	.3
Painting traffic centerline	89.12	.5	1,269.07	3.6	1,834.75	4.2
Erecting, removing and repairing snow fence	761.99	4.2	844.52	2.4	661.16	1.5
Repairing sand fence	1.16	-------	-------	-------	2.97	
Maintenance Stations upkeep	706.11	3.9	297.63	.8	104.57	.2
Seal coating	159.41	.9	-------	-------	1,859.99	4.3
Maintaining road approaches	40.81	.2	20.94	-------	1.25	
Landscape maintenance	553.61	3.1	1,821.15	5.1	1,425.98	3.3
Flattening slopes	65.00	.4				
Sanding slippery roads	13.75	-------	238.46	.7	176.03	.4
Rentals of garages, storage sheds, etc.	469.48	2.6	28.15	-------	116.64	.3
Administration	1,076.12	6.0	2,132.09	6.0	2,592.31	6.0
	$18,013.90	100.0	$35,690.48	100.0	$43,394.64	100.0

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON BITUMINOUS-TREATED, GRAVEL, GRADED, AND UNIMPROVED ROADS, FISCAL YEAR 1937

Operation	Bituminous treated	Percent	Gravel	Percent	Graded and unimproved	Per-cent
Building and repairing shoulders	$78,032.42	14.0				
Filling expansion joints and cracks and patching surface	56,915.54	10.2				
Cleaning ditches and culverts	29,316.01	5.3	$2,596.38	3.3	$774.45	2.3
Cutting weeds and brush	41,245.88	7.4	2,413.57	3.1	39.50	.1
Dragging and blading	......	......	29,846.74	38.2	14,704.40	42.9
Repairing and cleaning surface ditches	1,183.42	.2	26.50	......	216.06	.6
Raking rocks	......	......	754.66	.9	1,009.25	2.9
Erecting and repairing signs and markers	21,726.49	3.9	1,618.00	2.0	101.87	.3
Removing slides and trimming slopes	25,318.40	4.5	990.06	1.2	80.34	.2
Washouts	53,688.72	9.6	5,956.31	7.6	2,098.35	6.1
Hauling and spreading patching material	......	......	6,843.98	8.7	6,958.28	20.3
Snow removal	93,210.43	16.7	18,094.09	23.2	4,542.33	13.3
Repairing guard rail	2,892.72	.5	35.76			
Riprapping and protecting slopes	6,219.92	1.1	69.05	.1		
Removing debris and waste material along right of way	8,846.52	1.6	125.68	.1	69.92	.2
Repairing culverts	6,306.74	1.1	700.97	.9	154.97	.4
Reconditioning	35,054.33	6.3				
Repairing fences and gates on right of way	1,183.49	.2	57.16	.7		
Painting traffic centerline	16,865.03	3.0	24.45			
Erecting, removing and repairing snow fence	9,470.51	1.7	1,492.94	1.9	52.98	.1
Repairing sand fence	6.00					
Maintenance Stations upkeep	14,647.34	2.6	1,459.02	1.9	571.57	1.7
Seal coating	11,419.16	2.0				
Maintaining road approaches	3,172.12	.6	114.25	.1		
Landscape maintenance	1,425.75	.2	......	......	48.13	.2
Flattening slopes	3,193.61	.6	40.45	......	820.32	2.4
Sanding icy roads	2,047.85	.4	88.49	.1	3.36	
Rentals of garages, storage sheds, etc.	1,594.71	.3	4.75	......	4.50	
Administration	33,353,96	6.0	4,660.40	6.0	2,048.97	6.0
	$558,337.07	100.0	$78,013.66	100.0	$34,299.55	100.0

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON BRIDGES, FISCAL YEAR 1937

Operation	Amount	Percent
Channel work	$332.66	7.7
Substructure—General repairs	77.53	1.8
Substructure—Painting	335.00	7.8
Superstructure—General repairs	285.09	6.6
Superstructure—Painting	16.36	.4
Repairs to bridge surface	75.37	1.7
Approaches—General repairs and surfacing	2,602.43	60.5
Approaches—Guard rail	20.40	.5
Supplementary maintenance, including lighting, pumping system, etc.	33.25	.8
Inspection and administration	523.28	12.2
	$4,301.37	100.0

TOTAL EXPENDITURES FOR MAINTENANCE AND BETTERMENT WORK IN EACH COUNTY, FISCAL YEAR 1937

County	Mileage	Expenditures
Churchill	152.05	$30,350.42
Clark	271.52	84,355.96
Douglas	69.12	51,362.99
Elko	419.74	117,378.36
Esmeralda	172.76	44,283.44
Eureka	72.08	18,854.17
Humboldt	133.27	27,411.41
Lander	130.77	29,613.77
Lincoln	198.83	59,813.69
Lyon	157.68	54,926.41
Mineral	119.36	38,363.95
Nye	286.94	60,243.62
Ormsby	25.79	34,602.06
Pershing	74.98	22,873.05
Storey	9.15	9,859.43
Washoe	146.93	92,852.64
White Pine	256.85	68,887.98
	2,697.82	$846,033.35

MAINTENANCE REPORT FOR THE FISCAL YEAR JULY 1, 1937, TO JUNE 30, 1938

During the State's fiscal year ending June 30, 1938, the Department of Highways spent $756,305.26 for maintaining 2,770.20 miles of road. The total mileage includes improved and unimproved types of road and the total cost includes all direct and indirect charges to maintenance.

MAINTENANCE MILEAGE AND EXPENDITURES BY ROAD TYPE, FISCAL YEAR 1938

Type of road or construction	Mileage	Expenditures
Cement concrete	26.76	$16,592.02
Asphaltic concrete	39.40	28,364.71
Plantmixed bituminous-treated gravel	117.59	37,211.31
Roadmixed bituminous-treated gravel	2,159.12	513,845.41
Gravel	230.42	46,488.46
Graded and unimproved	196.91	24,568.59
Bridge maintenance	----------	9,144.54
*Additions and betterments	----------	80,090.22
	2,770.20	$756,305.26

*Comprising the following items:

Construction and repair of maintenance stations	$29,448.32
New bridges	6,461.30
Erection of new signs and markers	13,648.17
New snow fence	9,091.15
Repairing damages caused by floods	14,233.55
Install new guard rail	550.26
New riprap	1,415.40
Improving visibility junction Lake Tahoe and Kingsbury Grade	250.71
Placing gravel Nye 4–A–2	1,025.00
Cleaning channel Maynard Lake	1,353.88
Oil dust layer	1,270.56
Construct new right of way fence	1,341.92
	$80,090.22

MAINTENANCE COST PER MILE BY ROAD TYPE, FISCAL YEAR 1938

Type of surface	Mileage	Cost	Cost per mile
Cement concrete	26.76	$16,592.02	$620.03
Asphaltic concrete	39.40	28,364.71	719.92
Plantmixed bituminous-treated gravel	117.59	37,211.31	316.45
Roadmixed bituminous-treated gravel	2,159.12	513,845.41	237.99
Gravel	230.42	46,488.46	201.76
Graded and unimproved	196.91	24,568.59	124.77
	2,770.20	$667,070.50	$240.80

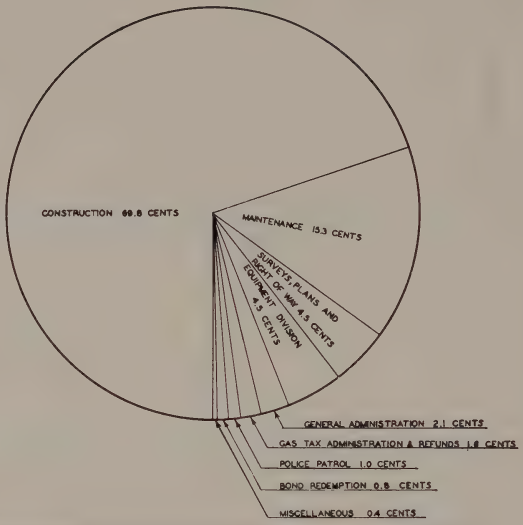
EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON CEMENT CONCRETE, ASPHALTIC CONCRETE, AND PLANTMIX BITUMINOUS-TREATED GRAVEL ROADS, FISCAL YEAR 1938

Operation	Cement concrete	Percent	Asphaltic concrete	Percent	Plantmix	Per-cent
Building and repairing shoulders	$2,087.47	12.6	$4,108.03	14.5	$4,255.84	11.4
Filling expansion joints and cracks and patching surface	2,766.08	16.7	3,861.94	13.6	5,271.83	14.2
Cleaning ditches and culverts	1,891.62	11.4	1,622.48	5.7	3,704.46	10.0
Cutting weeds and brush	658.26	4.0	1,200.86	4.2	2,793.97	7.5
Dragging and blading	....	....	....	....	....	....
Repairing and cleaning surface ditches	146.18	.9	63.15	.2	73.28	.2
Erecting and repairing signs and markers	1,297.85	7.8	1,303.91	4.6	1,834.37	4.9
Removing slides and trimming slopes	2,756.20	16.6	1,911.68	6.7	3,734.84	10.0
Repairing washouts	256.60	1.6	648.80	2.3	976.36	2.6
Removing snow	1,388.95	8.4	5,998.52	21.1	4,377.06	11.8
Repairing guard rail	115.37	.7	155.98	.6	92.28	.3
Riprapping and protecting slopes	31.84	.2	344.32	1.2	535.92	1.4
Removing debris and waste material along right of way	400.94	2.4	100.58	.4	1,245.74	3.4
Repairing culverts	29.50	.1	30.01	.1	240.21	.7
Reconditioning	....	....	....	....	....	....
Repairing fences and gates on right of way	69.73	.4	683.91	2.4	238.47	.7
Painting traffic centerline	209.60	1.3	713.22	2.5	1,279.16	3.4
Erecting, repairing and removing snow fence	25.66	.1	880.55	3.1	53.96	.1
Maintenance Stations upkeep	277.75	1.7	81.01	.3	189.43	.5
Seal coating	87.42	.5	....	....	292.19	.8
Maintaining road approaches	....	....	104.99	.4	31.95	.1
Landscape maintenance	217.18	1.3	1,324.10	4.7	2,191.39	5.8
Flattening slopes	....	....	383.88	1.4		
Sanding icy roads	33.00	.2	80.86	.3	187.72	.5
Rental of garages, storage sheds, etc.	265.50	1.6	62.00	.2	68.87	.2
Administration	1,579.32	9.5	2,699.93	9.5	3,542.01	9.5
	$16,592.02	100.0	$28,364.71	100.0	$37,211.31	100.0

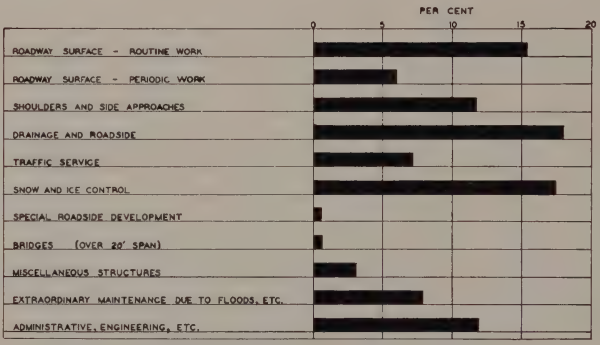
EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON BITUMINOUS–TREATED, GRAVEL, GRADED, AND UNIMPROVED ROADS, FISCAL YEAR 1938

Operation	Bituminous treated	Percent	Gravel	Percent	Graded and unimproved	Per-cent
Building and repairing shoulders	$98,793.36	19.2				
Filling expansion joints and cracks and patching surface	61,473.96	12.0				
Cleaning ditches and culverts	29,645.12	5.8	$1,905.27	4.1	$290.83	1.2
Cutting weeds and brush	48,753.11	9.5	776.49	1.7	6.94	
Dragging and blading	....	....	26,972.08	58.0	15,645.16	63.7
Repairing and cleaning surface ditches	2,097.44	.4	205.40	.5	83.48	.4
Raking rocks	....	....	1,149.82	2.5	660.89	2.7
Erecting and repairing signs and markers	17,373.48	3.4	700.89	1.5	147.28	.6
Removing slides and trimming slopes	27,217.42	5.3	670.13	1.5	27.58	.1
Repairing washouts	33,685.06	6.6	2,188.13	4.7	1,546.19	6.3
Hauling and spreading patching material	....	....	1,541.96	3.3	2,360.92	9.6
Snow removal	42,809.96	8.3	4,607.34	9.9	287.05	1.2
Repairing guard rail	1,333.16	.3	140.67	.3		
Protecting slopes and riprapping	6,345.96	1.2	4.14			
Removing debris and waste material along right of way	11,439.46	2.2	182.40	.4	4.35	
Repairing culverts	2,109.36	.4	191.40	.4	480.44	2.0
Reconditioning	40,442.86	7.9				
Repairing fences and gates on right of way	754.91	.1	11.94			
Painting traffic centerline	4,735.14	.9				
Erecting, repairing and removing snow fence	3,251.83	.6	24.25	....	177.11	.7
Maintenance Stations upkeep	10,394.48	2.0	635.56	1.4	433.70	1.8
Seal coating	13,899.88	2.7				
Maintaining road approaches	771.53	.2				
Landscape maintenance	2,107.90	.4				
Flattening slopes	1,053.98	.2	....	....	69.63	.2
Sanding icy roads	1,690.13	.3	52.92	.1	8.46	
Rental of garages, storage sheds, etc.	2,754.76	.6	102.60	.2		
Administration	48,911.16	9.5	4,425.07	9.5	2,338.58	9.5
	$513,845.41	100.0	$46,488.46	100.0	$24,568.59	100.0

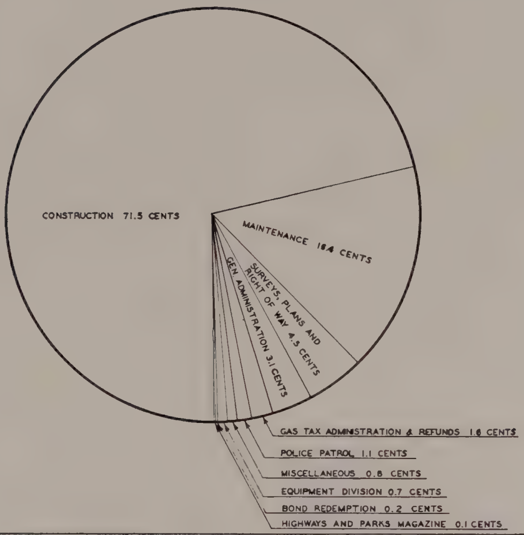
HOW YOUR HIGHWAY DOLLAR WAS SPENT
FISCAL YEAR 1937



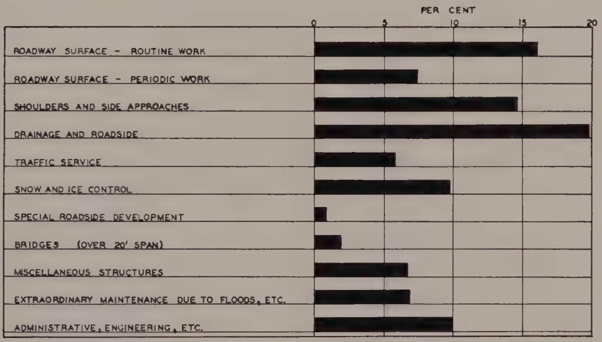
HOW YOUR MAINTENANCE DOLLAR WAS SPENT



HOW YOUR HIGHWAY DOLLAR WAS SPENT
FISCAL YEAR 1938



HOW YOUR MAINTENANCE DOLLAR WAS SPENT



EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON BRIDGES, FISCAL YEAR 1938

Operation	Amount	Percent
Channel work	$1,097.34	12.0
Substructure—General repairs	205.46	2.3
Substructure—Painting	71.91	.8
Superstructure—General repairs	826.83	9.0
Superstructure—Painting	208.92	2.3
Repairs to bridge surface	893.74	9.8
Approaches—General repairs and surfacing	2,588.04	28.3
Approaches—Guard rail	692.82	7.6
Supplementary maintenance, including lighting, pumping system, etc.	726.34	7.9
Inspection and administration	1,833.14	20.0
	$9,144.54	100.0

TOTAL EXPENDITURES FOR MAINTENANCE AND BETTERMENT WORK IN EACH COUNTY, FISCAL YEAR 1938

County	Mileage	Expenditures
Churchill	154.43	$33,728.70
Clark	271.52	88,590.92
Douglas	76.66	45,248.04
Elko	434.16	95,008.68
Esmeralda	178.80	36,244.18
Eureka	72.09	26,686.44
Humboldt	143.14	25,166.74
Lander	130.71	28,920.74
Lincoln	198.83	56,134.53
Lyon	157.70	41,270.23
Mineral	119.61	31,183.80
Nye	295.47	59,983.20
Ormsby	25.79	11,186.32
Pershing	80.22	14,214.98
Storey	9.12	9,722.15
Washoe	165.10	100,980.78
White Pine	256.85	52,034.83
	2,770.20	$756,305.26

ACCOUNTING

E. C. POHL, *Auditor*

The financial tables for the biennium show a slight decrease in receipts and disbursements over the previous two-year period. This decrease was due to a smaller construction program occasioned by the reduction of Federal aid allotments.

Accounting procedure of the Highway Department has not materially changed during the biennium, with the exception of the payment of contractor's estimates. In the department's last biennial report it was stated these payments were being made from a special National Industrial Recovery Highway Fund Trust Account which was created or made possible by the United States Treasury advancing to the State, with the approval of the Bureau of Public Roads, the sum of $600,000. Payments from this fund could be made for the work on projects financed from Federal funds designated as National Industrial Recovery, Works Program Highway, or Works Program Grade Crossing Elimination.

As all of these funds have been practically used up, and the department is now constructing projects with regular Federal aid allotments, Federal regulations will not permit the use of the trust fund for the payment of contractor's estimates, therefore all payments are made from the State Highway Fund.

The department has refunded to the United States Treasury $540,000 of the advance made, and the balance of $60,000 will be refunded by January 1, 1939, thereby eliminating the trust account.

At times the balance in the State Highway Fund is limited, and in order not to delay payment of contractor's estimates the State Controller transfers a certain amount from the General Fund to the State Highway Fund. This transfer can be made in accordance with chapter 67 of 1925 Statutes which gives the State Controller authority to transfer temporarily from the General Fund an amount not to exceed fifty percent of the total vouchers submitted to the Bureau of Public Roads and not paid. Statement of these vouchers is submitted to the State Controller each month.

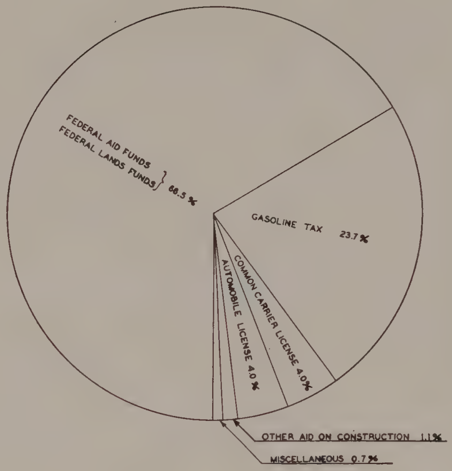
State highway bond redemption table shows a balance of $300,000 of bonds to be redeemed of the total issue of $1,900,000. The last $75,000 of these bonds will be redeemed in July 1941. Principal and interest on State highway bonds are paid from motor vehicle license fees.

In accordance with chapter 81 of the 1929 Statutes, the department has been paying from the State Highway Fund the principal and interest on certain county highway bonds issued in Churchill, Douglas, Eureka and Lyon Counties. There remains a balance of $15,000 of these bonds to be redeemed, all of which are in Lyon County. The last of the bonds will be redeemed in July 1940.

The following financial tables give a complete record as to receipts and disbursements by sources:

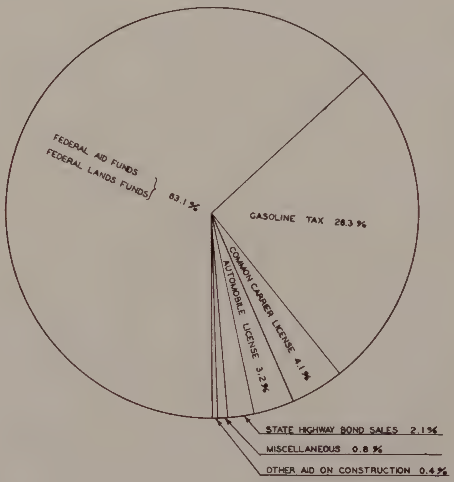
1937

SOURCE OF INCOME AND PER CENT OF TOTAL



1938

SOURCE OF INCOME AND PER CENT OF TOTAL



STATEMENT OF RECEIPTS

Classification	1917–1936	1937	1938	Total	Percentage
Legislative appropriation	$40,000.00			$40,000.00	.07
State tax levy	1,868,969.21	$499.66		1,869,468.87	3.21
Auto license fees (net)	1,773,607.74	200,887.56	$158,500.25	2,132,995.55	3.66
Gasoline tax	6,800,268.57	1,190,383.40	1,282,599.60	9,273,251.57	15.93
Racing Commission fees	147,428.86			147,428.86	.25
Common carrier license	753,635.32	200,734.30	201,699.83	1,156,069.45	1.99
Certificate of title	44,509.05			44,509.05	.08
Contractors' license		16,234.23		16,234.23	.03
Miscellaneous	678,965.91	18,940.71	52,926.27	750,832.89	1.29
State Highway bonds	1,800,000.00		100,000.00	1,900,000.00	3.26
Federal construction refunds	29,697,117.51	3,337,643.98	3,080,768.08	36,115,529.57	62.04
County construction refunds	4,072,307.16	21,267.10	2,366.09	4,095,940.35	7.03
County refunds on State maintenance	59,000.00			59,000.00	.10
County maintenance refunds	116,654.73			116,654.73	.20
Lincoln Highway Association construction refunds	71,426.60			71,426.60	.12
Utah-Nevada-California Association construction refunds	23,831.47			23,831.47	.04
San Francisco-Bay City construction refunds	25,000.00			25,000.00	.04
City construction refunds	174,053.32	35,402.63	3,097.46	212,553.41	.37
Railway crossing construction refunds	165,471.95		1,187.08	166,659.03	.29
	$48,312,247.40	$5,021,993.57	$4,883,144.66	$58,217,385.63	100.00
Advance to State by Government deposited in trust fund	600,000.00			600,000.00	
Totals	$48,912,247.40	$5,021,993.57	$4,883,144.66	$58,817,385.63	

STATEMENT OF DISBURSEMENTS

Classification	1917–1936	1937	1938	Total	Percentage
Highway construction	$37,667,010.01	$3,851,421.32	$3,295,886.99	$44,814,318.32	76.63
Surveys, plans, rights of way and preliminary engineering	1,773,749.57	247,986.84	207,372.40	2,229,108.81	3.81
County maintenance	114,846.29			114,846.29	.20
Equipment division and plants	626,578.25	246,942.54	30,193.15	903,713.94	1.54
Accounts receivable	624,168.39	20,283.23	37,804.42	682,256.04	1.17
Section 31 refunds	40,107.17			40,107.17	.07
County highway bond redemption	186,200.15	21,902.75	8,793.75	216,896.65	.37
Laboratory building		21,642.18		21,642.18	.03
General administration	1,109,357.96	109,803.12	142,502.47	1,361,663.55	2.33
Highway bulletin and publicity	9,308.35	4,076.14	6,570.28	19,954.77	.03
Special highway traffic count	34,491.42	5,777.99	422.31	40,691.72	.07
Police patrol highway	182,209.22	28,573.51	36,344.76	247,127.49	.42
Public Service Commission deputies	30,989.16	11,256.55	11,449.27	53,694.98	.09
Common carrier and truck license refunds	1,035.00	13,756.12	790.56	15,581.68	.03
Gas tax refunds	112,284.62	81,910.33	72,208.36	266,403.31	.46
Gas tax administration	3,508.16	4,454.50	3,750.83	11,713.49	.02
Maintenance	5,842,049.59	846,033.35	756,305.26	7,444,388.20	12.73
	$48,357,893.31	$5,515,820.47	$4,610,394.81	$58,484,108.59	100.00
Transfer to Revolving Fund	22,452.02			22,452.02	
Transfer to United States Treasurer from Trust Fund		200,000.00	340,000.00	540,000.00	
	$48,380,345.33	$5,715,820.47	$4,950,394.81	$59,046,560.61	

Prior to July 1935 gas tax refunds were paid from Gas Tax Fund and net collections credited to State Highway Fund. All gas tax collections are now deposited to credit of State Highway Fund and refunds shown as disbursement from this fund.

Reconcilement—

Total receipts	$58,817,385.63	
Total disbursements	59,046,560.61	
Highway balance July 1, 1938	$229,174.98	overdraft
Lists filed July 5 and 20, 1938 included in disbursements	279,628.56	
Controller's balance July 1, 1938	$50,453.58	
Controller's balance Highway Fund	26,254.64	
Controller's balance Trust Fund	24,198.94	
	$50,453.58	

STATEMENT OF RECEIPTS AND DISBURSEMENTS FOR THE PERIOD JULY 1, 1936, TO JUNE 30, 1938

RECEIPTS	1937	1938	Total	Percentage
Federal Aid	$3,337,643.98	$3,080,768.08	$6,418,412.06	64.80
County construction refunds	21,267.10	2,366.09	23,633.19	.24
City construction refunds	35,402.63	3,097.46	38,500.09	.39
Railroad crossing construction refunds		1,187.08	1,187.08	.01
Miscellaneous	18,940.71	52,926.27	71,866.98	.72
State tax levy	499.96		499.96	.01
State highway bonds		100,000.00	100,000.00	1.01
Gax tax	1,190,383.40	1,282,599.60	2,472,983.00	24.97
Auto license (net)	200,887.56	158,500.25	359,387.81	3.63
Common carrier, license	200,734.30	201,699.83	402,434.13	4.06
Contractors' license	16,234.23		16,234.23	.16
	$5,021,993.87	$4,883,144.66	$9,905,138.53	100.00
DISBURSEMENTS				
General administration	$109,803.12	$142,502.47	$252,305.59	2.49
Laboratory building	21,642.18		21,642.18	.21
Highway bulletin and publicity	4,076.14	6,570.28	10,646.42	.11
Special highway traffic count	5,777.99	422.31	6,200.30	.06
County highway bond redemption	21,902.75	8,793.75	30,696.50	.30
Police patrol highway	28,573.51	36,344.76	64,918.27	.64
Public Service Commission deputies	11,256.55	11,449.27	22,705.82	.22
Common carrier and truck license refunds	13,756.12	790.56	14,546.68	.14
Gas tax refunds	81,910.33	72,208.36	154,118.69	1.52
Gas tax administration	4,454.50	3,750.83	8,205.33	.08
Maintenance	846,033.35	756,305.26	1,602,338.61	15.83
Surveys, plans, rights of way, etc.	247,986.84	207,372.40	455,359.24	4.50
Equipment division and plants	246,942.54	30,193.15	277,135.69	2.74
Highway construction	3,851,421.32	3,295,886.99	7,147,308.31	70.58
Accounts receivable	20,283.23	37,804.42	58,087.65	.58
	$5,515,820.47	$4,610,394.81	$10,126,215.28	100.00
Transfer to United States Treasurer from Trust Fund	200,000.00	340,000.00	540,000.00	
	$5,715,820.47	$4,950,394.81	$10,666,215.28	

FEDERAL AID ALLOTMENTS

1921 and prior	$3,527,276.18
1922	953,436.78
1923	635,624.52
1924	826,360.27
1925	947,623.25
1926	956,576.00
1927	948,318.00
1928	948,510.00
1929	957,995.00
1930 Regular	960,375.00
1930 Public lands	588,914.00
1931 Regular	1,601,408.00
1931 Unused portion Hawaii allotment	4,288.00
1931 Advance	904,961.83
1932 Regular	1,598,987.00
1932 Public lands	440,683.00
1933 Regular	1,421,688.63
1933 Emergency	1,575,756.00
1934 National Recovery	5,675,875.00
1935 National Recovery	2,844,481.00
1936 Regular	1,595,501.00
1936 Public lands	553,135.00
1936 Works Program, highway	2,243,074.00
1936 Works Program, grade crossing elimination	887,260.00
1937 Regular	1,593,978.00
1938 Regular	1,632,385.00
1938 Secondary highways	326,477.00
1938 Grade crossing elimination	250,000.00
1938 Public lands	560,201.00
1939 Regular	1,590,172.00
1939 Secondary highways	318,034.00
1939 Grade crossings	243,750.00
1939 Public lands	559,895.00
	$40,672,999.46

STATEMENT OF COUNTY HIGHWAY BONDS

Principal and Interest Paid from State Highway Fund as Authorized by 1929 Statutes.

Calendar Year	Principal	Interest	Total
1929	$17,000.00	$4,521.65	$21,521.65
1930	18,000.00	7,407.00	25,407.00
1931	25,500.00	8,356.80	33,856.80
1932	25,500.00	6,935.55	32,435.55
1933	25,500.00	5,514.30	31,014.30
1934	23,500.00	4,093.05	27,593.05
1935	11,500.00	2,771.80	14,271.80
1936	11,500.00	2,140.55	13,640.55
1937	7,500.00	1,509.30	9,009.30
1938	7,500.00	1,077.90*	8,577.90
1939	7,500.00	646.88	8,146.88
1940	7,500.00	215.62	7,715.62
	$188,000.00	$45,190.40	$233,190.40

Total payments to June 30, 1938	$216,896.65
*Interest on Lyon County bonds last half 1938	431.25
Interest on Lyon County bonds 1939–1940	862.50
Balance of bonds to be redeemed (Lyon County)	15,000.00
	$233,190.40

Counties in Which Bonds Were Issued

County	Bonds issued	Interest	Total
Churchill	$53,000.00	$11,280.00	$64,280.00
Douglas	32,000.00	6,241.65	38,241.65
Eureka	28,000.00	3,950.00	31,950.00
Lyon	75,000.00	23,718.75	98,718.75
	$188,000.00	$45,190.40	$233,190.40

Total bonds issued	$188,000.00
Total bonds redeemed	173,000.00
Total bonds to be redeemed (Lyon County)	15,000.00

BIENNIAL REPORT

NEVADA HIGHWAY PLANNING SURVEY

JULY 1, 1936, TO JUNE 30, 1938

On the Crown of the Weathered Rocks Sits the Old Man of the Mountains in Cathedral Gorge, Lincoln County, Nevada.

NEVADA HIGHWAY PLANNING SURVEY

W. T. Holcomb, *Assistant Highway Engineer*

The State-wide Highway Planning Survey in Nevada was initiated in the latter part of 1935, but it was not until April 1936 that a uniform system of securing data was finally offered by the Bureau of Public Roads and field parties sent out from this office to obtain the desired information concerning roads, road use, and traffic.

The planning survey in this State, similar to that in operation in some 45 other States, is the outgrowth of a need, which has recently arisen, for definite information from which to program construction projects and to prepare plans for future improvement, not only on the Federal Aid Highway System but also on the secondary road system which is coming to play such an important part in the expenditure of road funds.

Since the Federal Aid System in any State is based upon and limited to a certain percentage of the entire road mileage, the determining of such a system is not entirely contingent upon the findings of the planning survey, but, to a greater or less degree, self-evident from prior knowledge of traffic trends and road usage. The determining of a secondary road system, however, is not such a simple matter, and in order that full and proper consideration might be given all local roads in each county the facts gathered by the planning survey are being considered.

There was so much information required, most of it necessitating entire State coverage, that the study was segregated into three main phases, they being listed as follows: (1) Inventory, (2) Traffic, (3) Financial.

A State manager with the status of Assistant Highway Engineer was appointed in charge of the entire survey, with an assistant manager for each of these three phases. The work of each phase is herein outlined separately, and a portion of the data gathered by the survey is shown.

Numerical coding, punching, and tabulating of the recorded information are explained in detail in the latter part of this report.

INVENTORY

Early in 1936 six survey parties were formed and sent into the field for the purpose of logging all local roads. These six parties logged and inventoried a total of 23,385 miles of road, including all types. It was the intent of the survey to include all public roads which were in general use and which served the communities or districts through which they passed. Each road covered was surveyed by compass and odometer, all structures were measured and their condition noted, and the surface type, width, and condition of the road itself recorded. All cultural improvements such as farms, dwellings, schools, mines, business establishments, public buildings, etc., were included in the inventory and the location of each with respect to the road was recorded.

School-bus and mail-route data were obtained and the information recorded when a road or section thereof was used for either of these services.

Roads were classified under five general types as follows:

Paved Roads. All types of hard-surfaced roads built under definite alignment and curvature and under controlled specifications.

Gravel Roads. Those constructed under the same standards as the above classification but upon which pavement or hard surface had not yet been applied.

Graded and Drained Roads. Those constructed of natural earth, aligned and graded to permit reasonably convenient use by motor vehicles, and drained by longitudinal and transverse drainage systems.

Unimproved Earth Roads. Those of which the wearing surface was for the most part the natural ground of the region traversed, and upon which some public funds had been expended and some degree of maintenance performed.

Primitive Roads. Those unimproved, upon which public funds have not been expended but which are usable by four-wheel vehicles and publicly traveled by a small number.

The following table shows the mileage of roads for each county in Nevada classified under various systems and by surface types:

TABLE NO. 1

Summary of Roads in Nevada by Counties, Systems and Types

System	Paved	Gravel	Graded and drained	Unimproved	Primitive	Totals
Churchill County—						
Federal Aid	125.6					125.6
Primary State*	26.5					26.5
Secondary State*	2.8			32.1	21.9	56.8
County roads not on State System	23.0	6.3	47.9	436.1	325.9	839.2
County totals	177.9	6.3	47.9	468.2	347.8	1,048.1
Clark County—						
Federal Aid	140.0					140.0
Primary State*	98.4					98.4
Secondary State*	49.8	30.2	11.1	74.9	31.8	197.8
County roads not on State System	26.4	28.8	15.8	339.3	650.3	1,060.6
County totals	314.6	59.0	26.9	414.2	682.1	1,496.8
Douglas County—						
Federal Aid	60.2					60.2
Primary State*	9.4					9.4
Secondary State*	7.6		3.2	9.1		19.9
County roads not on State System	2.7	1.2	36.0	91.3	114.4	245.6
County totals	79.9	1.2	39.2	100.4	114.4	335.1
Elko County—						
Federal Aid	333.0					333.0
Primary State*	10.8	23.0		73.6		107.4
Secondary State*	1.1	18.0	2.5	294.9		316.5
County roads not on State System		35.5	17.5	1,631.7	988.3	2,673.0
County totals	344.9	76.5	20.0	2,000.2	988.3	3,429.9

*Non-Federal Aid.

TABLE No. 1—*Continued*

System	Paved	Gravel	Graded and drained	Unimproved	Primitive	Totals
Esmeralda County—						
Federal Aid	97.3					97.3
Primary State*	18.7					18.7
Secondary State*		35.4		57.3		92.7
County roads not on State System		0.6		200.2	508.1	708.9
County totals	116.0	36.0		257.5	508.1	917.6
Eureka County—						
Federal Aid	71.9					71.9
Secondary State*			28.4	164.4		192.8
County roads not on State System		4.2	36.5	235.7	485.8	762.2
County totals	71.9	4.2	64.9	400.1	485.8	1,026.9
Humboldt County—						
Federal Aid	133.0					133.0
Secondary State*		104.8	26.9	89.7	7.8	229.2
County roads not on State System		55.6	52.1	544.0	990.7	1,642.4
County totals	133.0	160.4	79.0	633.7	998.5	2,004.6
Lander County—						
Federal Aid	108.1					108.1
Primary State*		21.9		86.8		108.7
Secondary State*		8.5		78.2		86.7
County roads not on State System		31.0	75.5	336.7	485.0	928.2
County totals	108.1	61.4	75.5	501.7	485.0	1,231.7
Lincoln County—						
Federal Aid	54.1	25.1				79.2
Primary State*	97.1	0.0	22.3			119.4
Secondary State*			3.5	87.5	14.8	105.8
County roads not on State System	5.0	1.2	32.4	578.7	919.7	1,537.0
County totals	156.2	26.3	58.2	666.2	934.5	1,841.4
Lyon County—						
Federal Aid	105.8		2.3			108.1
Primary State*	22.9	26.7	0.0			49.6
Secondary State*		0.2	5.8	51.5	9.5	67.0
County roads not on State System			79.8	191.5	333.9	605.2
County totals	128.7	26.9	87.9	243.0	343.4	829.9
Mineral County—						
Federal Aid	109.1			26.5		135.6
Primary State*	10.3					10.3
Secondary State*		0.3		7.0	69.6	76.9
County roads not on State System	6.8	4.1	50.8	189.8	507.5	759.0
County totals	126.2	4.4	50.8	223.3	577.1	981.8
Nye County—						
Federal Aid	20.1	12.8				32.9
Primary State*	189.7	48.9		48.2		286.8
Secondary State*		10.7	21.7	193.7	48.2	274.3
County roads not on State System		3.0	27.4	905.6	1,498.4	2,434.4
County totals	209.8	75.4	49.1	1,147.5	1,546.6	3,028.4
Ormsby County—						
Federal Aid	20.7					20.7
Primary State*	3.7					3.7
Secondary State*	1.0					1.0
County roads not on State System	1.6	0.4	3.1	31.1	22.0	58.2
County totals	27.0	0.4	3.1	31.1	22.0	83.6

*Non-Federal Aid.

TABLE No. 1—*Continued*

System	Paved	Gravel	Graded and drained	Unimproved	Primitive	Totals
Pershing County—						
Federal Aid	75.0	--------	--------	---------	-----------	75.0
Secondary State*	5.6	13.0	7.1	53.9	97.9	177.5
County roads not on State System	---------	56.4	37.0	509.2	958.2	1,560.8
County totals	80.6	69.4	44.1	563.1	1,056.1	1,813.3
Storey County—						
Federal Aid	4.4	5.0	--------	---------	-----------	9.4
Secondary State*	---------	--------	--------	---------	14.0	14.0
County roads not on State System	0.3	2.7	0.1	33.7	33.5	70.3
County totals	4.7	7.7	0.1	33.7	47.5	93.7
Washoe County—						
Federal Aid	96.7	--------	--------	---------	-----------	96.7
Primary State*	10.4	--------	--------	---------	-----------	10.4
Secondary State*	35.1	90.8	32.0	124.0	2.2	284.1
County roads not on State System	13.2	6.8	96.8	381.6	427.0	925.4
County totals	155.4	97.6	128.8	505.6	429.2	1,316.6
White Pine County—						
Federal Aid	164.3	26.9	--------	---------	-----------	191.2
Primary State*	37.6	0.0	--------	---------	-----------	37.6
Secondary State*	18.7	5.4	--------	128.9	-----------	153.0
County roads not on State System	6.4	35.0	92.9	709.9	680.3	1,524.5
County totals	227.0	67.3	92.9	838.8	680.3	1,906.3
Grand total	2,461.9	780.4	868.4	9,028.3	10,246.7	23,385.7

As the mapping and tabulating work progressed, it was found necessary at times to send a special party into the field to check subsequent information obtained from other sources such as the planning surveys of adjoining States, and to reconcile apparent discrepancies in the location of interstate roads and boundaries.

Subsequent to the general road inventory, special studies were undertaken on the improved highway system to obtain data such as "Sight Distance," "Curvature," and "Super-Elevation." A specially equipped and schooled party was engaged in the above-mentioned studies. The various features were measured and recorded under actual driving conditions with a view to determining existing hazards and making possible a comprehensive study of needed improvements or changes in future design and location.

Also a detailed study and inventory of railroad grade crossings in urban areas were undertaken by a special field party. The several railroad systems in the State have furnished the highway planning survey with maps of their rights of way, lists of all public crossings on their respective systems, and reports, covering a period of five years, of all accidents occurring at grade crossings. This information has been coded and tabulated and will be used in a future study of a grade crossing elimination or hazard reduction program.

MAPPING

Mapping of the State by counties was begun on May 4, 1936. Because of the large areas of unsettled lands in Nevada, and considerable distances between populated districts, approval was given for maps to be drawn on the scale of one-half inch to a mile, the more densely populated areas to be enlarged to suitable scales for the purpose of showing the required cultural symbols. Most of the other States engaged in planning survey work are making maps on the scale of one inch to a mile.

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*Non-Federal Aid.

Realizing at the outset that many of the then existing maps of identical or overlapping areas, produced by various mapping agencies, were at variance with each other, it was determined to construct base maps from information obtained from primary sources. The United States Coast and Geodetic Survey and the United States Geological Survey having extended the triangulation net to numerous parts of the State, a most valuable means of coordinating the land surveys was thereby established. Due consideration was given to the different map projections in general extensive use, and the final decision was in favor of the Lambert Conformal Conic Projection. By using this system all contiguous parts of the entire group of maps may be successively joined together into a complete whole, directional lines may be accurately determined directly from the maps, and the scale differences usually present in different portions of a map of such a large area are reduced to a negligible quantity. It was found by comparatively simple computations that a modification of the Lambert projection could be used with highly satisfactory results without the necessity of compiling the more complicated system of Lambert coordinates of all points for which the latitude and longitude had been determined by triangulation. This modification has been published in mimeographed and blue print form and is available to any of the mapping agencies which may desire a copy.

The northern boundary of Nevada is legally fixed as being on the forty-second parallel of north latitude adjoining Oregon and Idaho. The eastern boundary adjoins Utah and Arizona south to an intersection with the Colorado River in the approximate longitude of 114° 03′ west from Greenwich, thence following down the Colorado to its intersection with the thirty-fifth parallel of north latitude. The southern boundary is an oblique geodetic line between Nevada and California, extending from the Colorado River at the thirty-fifth parallel of latitude to the intersection of the thirty-ninth parallel and the one hundred twentieth meridian, the latter point being in Lake Tahoe about three and one-half miles from the southeast shore. The western boundary adjoins California along the one hundred twentieth meridian between the thirty-ninth and forty-second parallels.

The Nevada maps have been constructed by using one degree quadrangles of latitude and longitude, there being required thirty-five such sheets to cover the State. By means of land ties to triangulation stations the plotting of General Land Office surveys has been kept under adequate control wherever such surveys are reliable. Owing to the fact that much of the surveyed lands of the State were surveyed between the years 1860 and 1910, when the contract system of public land surveys was the rule, numerous fraudulent or erroneous surveys were the result, which has caused an almost endless amount of difficulty in the mapping program. Not until new surveys and retracements of old surveys have been made will it be possible to eliminate these difficulties. However, the work of the mapping division has brought to light many of the apparent errors in surveys executed in the early days, and has corrected to a considerable degree the errors found in other existent maps. These findings undoubtedly will prove of great value to the General Land Office, the United States Coast and Geodetic Survey, and the United States Geological Survey in determining field survey procedure in the future in the areas affected.

When the land net and other features of the maps are completed, county lines are delineated upon the quadrangle sheets, and as the quadrangle sheets fit up accurately the county map sheet tracings are made with little or no matching difficulty. This method has materially improved the attained results and has also reduced the drafting time and cost when compared with attempting to draft the individual counties.

The base series of county maps comprises a total of forty-eight sheets of uniform size, 36 by 38 inches. Ormsby and Storey Counties, because of their small size, are to be drawn on the scale of one inch to a mile. This series will show all of the roads logged by the inventory parties of the planning survey, classified by symbols as primitive or other roads. Other features of topography are shown by appropriate cultural symbols in accordance with an approved uniform legend. Upon completion of the base tracings, two sets of duplicate tracings will be made, one of which will be used to make a general highway and transportation series, the other to make a school-bus and postal-route series. Finally, using the county maps as a basis, a new base map of the State as a whole will be drawn and duplicate tracings made for producing the corresponding series of State maps.

The Nevada highway planning survey has sought and obtained much valuable material from numerous sources, and gratitude is hereby expressed to those agencies and individuals which have furnished such assistance.

Geographic positions of all triangulation stations established in Nevada and in neighboring States in the vicinity of its boundaries were obtained from the United States Coast and Geodetic Survey, the United States Geological Survey cooperating.

Maps which have been used either as guides or checks to the mapping work in hand are:

United States Geological Survey quadrangle maps.

United States Geological Survey maps of Nevada river surveys.

United States General Land Office plats, use of which has been generously granted by the office of the Surveyor General of Nevada.

The Reno Public Survey Office.

United States Land Office at Carson City.

United States Bureau of Reclamation maps.

Soil Conservation Service maps.

United States Forest Service maps.

United States Indian Service maps.

Department of Commerce aeronautical charts.

State Engineers' maps and files.

Various city and county maps.

Strip maps of State boundaries furnished by the planning surveys of adjacent States.

Various maps of private surveys loaned or given by individuals.

General Highway Department maps and plans.
Railroad valuation maps.

TRAFFIC

It has been the duty of the traffic division of the State Planning Survey to study the many phases of traffic conditions and movements throughout the entire State. In order to secure the factual data for this study, it was necessary to go into the field and conduct surveys. These were carried on for a period of one year, this length of time being required in order to observe traffic movement during the seasonal fluctuations and under varying road and occupational conditions.

In order to secure the desired information the traffic survey was divided into five divisions, namely: (1) Key counts, (2) blanket counts, (3) loadometer stations, (4) pit scale stations, and (5) automatic recorders.

KEY STATIONS

Key stations were placed at seventy-two selected locations on the principal highways of the State. These locations were so selected as to cover the main intersections on the highway system. Either seventeen or eighteen counts were taken at each of the 72 locations. The schedule was so arranged as to permit seven counts at each station from 6 a. m. to 2 p. m., seven counts from 2 p. m. to 10 p. m., and either three or four from 10 p. m. to 6 a. m. Counts were taken during each month of the year with one 6 a. m. to 2 p. m. and one 2 p. m. to 10 p. m. recording for each day of the week. This arrangement was necessary to show hourly, day of week, and monthly peaks and fluctuation. A total of 1,260 eight-hour counts was made at the 72 key stations during the year.

Data obtained in these counts included hourly density of bicycles, pedestrians, horse-drawn vehicles, local passenger cars, local commercial vehicles, foreign passenger cars, foreign commercial vehicles, and the origin and destination of a representative sample of all passenger vehicles. The commercial vehicles were classified as light, medium, and heavy trucks, tractors, trucks and semitrailers, trucks with trailers, and school and other type busses.

During the year a total of 286,216 vehicles were observed at key stations, classified as follows:

148,746, or 51.97% local passenger.
41,978, or 14.67% local commercial.
92,112, or 32.18% foreign passenger.
3,380, or 1.18% foreign commercial.

By determining the origin and destination of vehicles, it was possible to estimate the number which would use short cuts or proposed routes if constructed. In order that this information would be available, on certain specified days all passenger cars were stopped and the origin, destination, and place of ownership of the vehicle determined and recorded. This information was secured on 10,553 passenger vehicles at key stations during the survey.

After the collection in the field of the foregoing data, summary sheets were compiled which showed vehicles observed on each intersecting road at each of the 72 stations, the average annual 24-hour traffic, both as to total volume and vehicle class, and average Saturday, Sunday, and weekday traffic. The average number of intersecting roads at key stations being 3.26, the foregoing information is readily available on 235 sections of highway in the State.

The information on traffic volume was also used to obtain factors to expand a sample eight-hour count taken any day of the week and any month of the year to an average annual 24-hour volume. By the use of these factors it will be possible in the future to take short counts and thereby determine the percentage increase or decrease in annual traffic flow as well as predict future traffic volumes.

BLANKET STATIONS

Blanket count stations were placed at intersections of primary roads with primary roads, secondary with primary, main secondary with main secondary, and at strategic points on local roads. An effort was made to place the blanket stations in such a manner that a traffic sample could be taken on every road inventoried by the inventory division. This was necessary, inasmuch as traffic was to be determined for each mile of road in the State.

Blanket counts were divided into two main divisions—primary and local. The primary stations were those placed at a junction of primary roads or a primary and a local road. The local stations were placed on the local roads, at varying distances from the primary system to trace the traffic flow into the outlying districts. These two types of blanket stations were in turn divided into single-count stations, where only one eight-hour count was taken, and control stations where two or more eight, sixteen, or twenty-four hour checks were made. These counts were conducted simultaneously with the key stations in order that the relationship of the two types of traffic might be determined and analyzed.

151,338 vehicles were observed during 1,780 eight-hour blanket counts located at 1,179 points throughout the State. Table No. 2 shows the distribution by counties of these stations together with total traffic per county and average traffic per station in the respective county.

TABLE NO. 2

Distribution by Counties of Blanket Stations, Total Traffic, and Average Per Count

County	Number of stations	Number of counts	Total traffic	Average per count
Churchill	90	121	10,666	88
Clark	98	174	19,768	114
Douglas	36	56	4,571	82
Elko	129	192	8,326	43
Esmeralda	55	96	1,835	19
Eureka	42	59	1,191	20
Humboldt	83	122	5,641	46
Lander	46	75	1,540	21
Lincoln	65	118	3,462	29
Lyon	98	140	8,402	60
Mineral	57	88	2,396	27
Nye	64	95	2,520	27
Ormsby	31	39	4,303	110
Pershing	69	108	7,410	69
Storey	13	16	973	61
Washoe	111	155	55,834	360
White Pine	92	126	12,500	99
Totals	1,179	1,780	151,338	85

Information obtained at blanket stations was practically the same as that at key stations except that trucks were divided into six weight classifications instead of three and notation was made of all commercial vehicles proceeding to or from a railroad station, wharf, or boat.

ORIGIN AND DESTINATION STUDIES

During the count 14,481 vehicles were stopped and the origin, destination, and place of ownership determined at blanket stations, while the same information was secured on 10,553 vehicles at key stations.

Special origin and destination studies were conducted on one or two routes in the State.

Data collected in these latter studies included hour of travel, type of vehicle, seating capacity, number of passengers, truck classification, capacity, and tire sizes, commodity carried by trucks, State of registration, trip origin, trip destination, direction of travel, routes followed, where stops were made, purpose of stops, purpose of trip, and length of stay in Nevada.

These studies were made to provide a basis for estimates of the probable number of users of the particular routes under consideration. The route traveled may indicate the choice of the traveler only to the extent of other possible routes available. If the stops indicated were operation stops only, that is, to purchase gas, oil, food, lodging, etc., a shorter, more scenic or better improved route might have been selected. However, if the stops indicated that the choice of route was made in order to transact business, visit friends or relatives, or see some scenic attraction, it is fairly conclusive that no other route would have been traveled, regardless of distance, improvement, or other attractive features. Thus by careful analysis of the data obtained, the feasibility of construction on a basis of travel return and diversion from other routes could be estimated with reasonable accuracy.

As the need arises, other special origin and destination studies will be made for the routes under consideration.

These origin and destination studies, combined with those at key, special origin and destination, and loadometer stations provided information on 45,583 vehicles in the State. After being coded, the origin-destination information was then punched on cards, which were run through the tabulating machine. The analysis of this study was made on the basis of eight tables showing number and percentage of observed vehicles by type, and estimated vehicle miles on major classes of roads by (1) urban and rural ownership, (2) ownership and trip classification, (3) ownership and trip extent, (4) ownership and type of origin and destination, (5) county origin and destination, and (6) State origin and destination. Tables 5 and 6 were analyzed separately for passenger cars, trucks and busses, and also for primary and secondary roads.

From the blanket counts expansion factors were obtained for application on similar types of roads. These factors, like those at key stations, are used to expand eight-hour counts to annual 24-hour averages.

To secure expansion factors it was necessary to divide the State into zones or sections so that, as nearly as possible, similar occupational, climatic, and travel characteristics prevailed at the stations within that zone. Consideration was given to traffic volume and weighting was found to be necessary in order to bring light and heavy stations to average levels for purposes of comparison. Factor curves were drawn and smoothed when abnormal conditions were obvious. These factors were checked numerous times during the various steps and after completion. They were not used until, after comparison with other types of counts and various tests, they proved to be acceptable.

From the traffic data secured at blanket and key stations, flow and density maps will be made and vehicle miles will be estimated.

Table No. 3 showing number of vehicles and tourists entering Nevada, and No. 4, annual expenditures of tourists in Nevada are submitted herewith.

TABLE NO. 3

Estimated Number of Foreign Vehicles and Tourists Entering Nevada During Fiscal Year 1937 Based on Key Traffic Counts at or Near State Lines

Route No.	Number foreign cars per 24 hrs.	Number foreign cars per year	Number tourists per 24 hrs.	Number tourists per year
U S 40	443	161,695	1,218	444,661
U S 50	187	68,255	514	187,701
U S 6	15	5,475	41	15,056
U S 91	481	175,565	1,323	482,804
U S 93	131	47,815	360	131,491
U S 395	222	81,030	610	222,833
S R 8, McDermitt-Winnemucca	9	3,285	25	9,034
S R 3 and 5, Topaz Junction to Searchlight	30	10,950	82	30,113
S R 27, Mt. Rose	12	4,380	33	12,045
S R 28, Spooners-Cal-Neva	71	25,915	195	71,266
S R 25, Panaca east	8	2,920	22	8,030
S R 53, Jean-Goodsprings	6	2,190	16	6,023
S R 29, Death Valley Junction	15	5,475	41	15,056
S R 37, Minden-Woodfords	23	8,395	63	23,086
S R 22, Wellington-Bridgeport	9	3,285	25	9,034
S R 19, Kingsbury Grade	11	4,015	30	11,041
S R 11 and 43, Elko-Owyhee	2	730	6	2,008
Totals	1,675	611,375	4,604	1,681,282

TABLE NO. 4

Estimated Tourist Expenditures for All Purposes in Nevada, Fiscal Year 1937, Based on Assumption that 20 Percent of Tourist Dollar Is Spent for Transportation

Route	Miles	Foreign cars per 24 hours	Daily vehicle miles	Annual vehicle miles	Gallons gasoline	Cost of gasoline @ 22¢	Tourist dollars
U S 40	418.6	346	144,836	52,865,140	3,620,900	$796,598.00	$7,294,853.47
U S 50	468.3	89	41,679	15,212,835	1,041,975	229,234.50	2,099,216.99
U S 6	285.8	10	2,858	1,043,170	71,450	15,719.00	143,946.88
U S 91	128.3	505	64,792	23,649,080	1,619,800	356,356.00	3,263,333.35
U S 93	430.2	31	13,336	4,867,640	333,400	73,348.00	671,684.97
U S 395	80.2	284	22,777	8,313,605	569,425	125,273.50	1,147,193.20
S R 8, McDermitt-Winnemucca	73.9	20	1,478	539,470	36,950	8,129.00	74,441.39
S R 3 and 5, Topaz Junction to Las Vegas excluding Coaldale and Tonopah	366.6	52	19,063	6,957,995	476,575	104,846.50	960,132.77
S R 1A, Fallon-Schurz	38.8	24	931	339,815	23,275	5,120.50	46,891.02
S R 2B, Fernley-Yerington	47.3	11	520	189,800	13,000	2,860.00	26,190.48
S R 27, Mt. Rose	22.3	28	624	227,760	15,600	3,432.00	31,428.57
S R 28, Spooners-Cal-Neva	15.6	122	1,903	694,595	47,575	10,466.50	95,847.07
S R 39, Mt. Charleston	21.3	8	170	62,050	4,250	935.00	8,562.27
S R 25, Panaca east	23.1	15	347	126,655	8,675	1,908.50	17,477.11
S R 53, Jean-Goodsprings	7.6	10	76	27,740	1,900	418.00	3,827.84
S R 29, Death Valley Junction	16.4	30	492	179,580	12,300	2,706.00	24,780.22
S R 37, Minden-Woodfords	7.9	40	316	115,340	7,900	1,738.00	15,915.75
S R 22, Wellington-Bridgeport	30.8	12	370	135,050	9,250	2,035.00	18,635.53
S R 19, Kingsbury Grade	12.3	20	246	89,790	6.150	1,353.00	12,390.11
S R 11 and 43, Elko-Owyhee	107.4	4	430	156,950	10,750	2,365.00	21,657.51
Totals	2,602.7	1,661	317,214	115,794,060	7,931,100	$1,744,842.00	$15,978,406.50

Division of Tourist Dollar

20% transportation expense—gas, oil, tires, accessories, repairs, etc.	$3,195,681.30
20% accommodations—Hotels, tourist camps, etc.	3,195,681.30
*25% retail purchases—Clothing, camp equipment, s accessories, etc. ($3,994,601.63)	798,920.33
21% meals and provender	3,355,465.36
8% amusement	1,278,272.52
6% refreshments	958,704.39
Total tourist expenditures in State of Nevada	$12,782,725.20

*It is estimated that only 20% of this item is spent in Nevada.

NOTE—The estimate that 20% of the tourist dollar is spent for transportation was published in the May 31, 1938, issue of the weekly press release of the American Petroleum Institute.

After July 1, 1936, all counting and field work, with the exception of supervision, was done by WPA labor. These men were secured through the local reemployment offices and their field of employment confined, as nearly as possible, to their home area, thereby limiting travel expense to a minimum and their field of operations to familiar territory.

The field recorders traveled 57,767 miles at a cost of $2,310.68 to the WPA.

The wage cost to the WPA for the year of operation was $8,611.88, expended in the manner prescribed by their rules and regulations. The Works Progress Administration, therefore, contributed a total of $10,922.56 toward the cost of the blanket survey.

LOADOMETER STATIONS

At 36 selected places on the primary highway system, loadometer weighing stations were operated.

Loadometer crews worked on the same schedules as key station recorders in order to get similar samples of all types and kinds of traffic. Commercial vehicles were stopped and weighed. Additional information taken at the same time included State of registration, registration class, license number, type of vehicle, type of body, rated capacity or seating capacity, city, county, and State of origin and destination, trip mileage, type of origin and destination, commodities carried or number of passengers, operating classification, wheel loads, loaded weights, empty weights, carried load, maximum axle, and number of axles.

During the count 20,549 trucks and busses were weighed in 648 eight-hour periods during the year of operation. This permitted the department to estimate the tonnage moving over the highway system as well as to determine the amount and percentage of vehicles which were carrying an overload. A set of one hundred tables have been completed which analyze the results of the weight survey from the standpoint of the 19 items in the loadometer field report form. The complete and extensive analysis was made possible by using machine tabulation. The information on the field reports was coded and a card showing the detailed information was punched for each vehicle. With the controls of the tabulating machine at the proper setting the desired information may be tabulated by running the cards through the tabulator.

PIT SCALE STATIONS

In addition to the 36 loadometer stations operated throughout the State, three locations were selected for the installation of platform scales. These scales were placed (1) on U S 40 near the west city limits of Reno;(2) at the intersection of U S 40 and U S 93 approximately one-half mile east of Wells; and (3) on U S 91 near the south city limits of Las Vegas. These locations were selected in order to intercept a fair sample of interstate and transstate vehicles as well as the intrastate trucks and busses.

Data obtained were somewhat different from those secured at loadometer stations and included State of registration, registration class, license number, make and year, type of vehicle, type of body, manufacturer's rated capacity or seating capacity, commodities carried or number of passengers, tire equipment, tire sizes, overall width, overall length, wheel base, maximum height, rear axle weight, loaded weight, empty weight, carried load, total weight of combination, and direction of travel.

Trucks and busses totalling 5,970 were weighed during the 270 eight-hour operations. The schedules were so arranged as to permit the crew to operate continuously at one station for six weeks. Weighing of vehicles from one direction occupied a period of three weeks, operating one week from 6 a. m. to 2 p. m., one week from 2 p. m. to 10 p. m., and one from 10 p. m. to 6 a. m. The procedure was then repeated, weighing vehicles from the opposite direction. This method was followed to allow the minimum delay and congestion for truck and bus operations.

A code of uniform limits of weights and measurements of trucks and busses has been recommended by the American Association of State Highway Officials, American Association of Motor Vehicle Administrators, The American Automobile Association, American R. R. Association, Automobile Manufacturing Association, and others for State-wide adoption.

These restrictions are as follows:

Maximum width, 96 inches.

Maximum height, 12 feet, 6 inches.

Maximum length, single vehicle 35 feet; tractor-truck and semi-trailer 35 feet; trailer combination 45 feet.

Wheel loads, when equipped with high pressure pneumatic, solid rubber, or cushion tires, 8,000 pounds; when equipped with low pressure pneumatic tires, 9,000 pounds.

Axle loads, when equipped with high pressure pneumatic, solid rubber, or cushion tires, 16,000 pounds; when equipped with low pressure pneumatic tires, 18,000 pounds.

At the convention of the Western Association of State Highway Officials in Reno, August 10 to 12, 1938, a resolution was passed adopting the following uniform limits of weights and measurements:

"1. *Width.* No vehicle shall exceed a total outside width, including any load thereon, of 8 feet, except vehicles now in operation which, by reason of the substitution of pneumatic tires for other types of tires, exceed the above limit, provided further, that in no case shall such width exceed 102 inches, and that after January 1, 1945, no equipment exceeding 8 feet in width shall be operated.

2. *Height.* No vehicle unladen or with load shall exceed a height of 12 feet, 6 inches, except that the public body having jurisdiction may, at its discretion, reduce this height to heights consistent with the condition of individual sections of highway.

3. *Length.* (a) No vehicle shall exceed a length of 35 feet extreme overall dimension, inclusive of front and rear bumpers.

(b) Combinations of vehicles shall consist of not more than two units, and, when so combined, shall not exceed a total length of 60 feet, except that the public body having jurisdiction may, at its discretion, reduce this length to lengths consistent with the condition of individual sections of highway.

(c) For occasional movements of materials or objects of dimensions which exceed the limits herein provided, a special permit shall be required.

4. *Speed.* (a) Minimum speed. No motor vehicle shall be unnecessarily driven at such a slow speed as to impede or block the normal and reasonable movement of traffic, except when reduced speed is necessary for safe operation or when a vehicle or a combination of vehicles is necessarily, or in compliance with law, proceeding at reduced speed.

(b) Maximum speed. No truck shall be operated at a speed greater than 45 miles per hour.

(c) Vehicles equipped with solid rubber or cushion tires shall be operated at a speed not in excess of 10 miles per hour.

5. *Axle Load.* (a) The wheels of all vehicles, including trailers, except those operated at 10 miles per hour or less, shall be equipped with pneumatic tires.

(b) No wheel equipped with pneumatic tires shall carry a load in excess of 9,000 pounds, nor shall the total load carried by any axle having wheels equipped with pneumatic tires exceed 18,000 pounds.

No wheel equipped with solid rubber or cushion tires shall carry a load in excess of 8,000 pounds, nor shall the total load carried by an axle having wheels equipped with such tires exceed 16,000 pounds.

An axle load shall be defined as the total load on all wheels whose centers may be included between two parallel transverse planes 40 inches apart.

(c) These limitations are recommended for all main rural and intercity roads, but should not be construed as inhibiting heavier axle loads in metropolitan areas if any State desires.

(d) These weight specifications for wheel and axle loads may be restricted by the State Highway Department for a reasonable period where road conditions justify this action.

6. *Gross Weights.* (a) Subject to the limitation imposed by the recommended axle loads, no vehicle or combination of vehicles shall be operated whose gross weight, with load, exceeds that given by the formula

$W = 750 (L + 40)$ where

$W =$ total gross weight, with load, in pounds;

$L =$ the distance between the first and last axles of a vehicle or combination of vehicles in feet.

The same limitations shall be applied to any group of axles within the vehicle or combination of vehicles.

(b) Provided further that the total weight, with load, on any group of axles of a vehicle or combination of vehicles where the distance between the first and last axles of the group is 18 feet or less, shall not exceed that given by the formula

$W = 650 (L + 40)$ where

$W =$ total gross weight, with load, in pounds on the group of axles under consideration;

$L =$ the distance between the first and last axles of the group under consideration

7. *Load Per Inch of Tire Width.* No wheel equipped with pneumatic, solid rubber, or cushion tires shall carry a load in excess of 600 pounds for each inch of tire width.

The width of pneumatic tires shall be taken as the manufacturer's rating. The width of solid rubber and cushion tires shall be measured at the flange of the rim."

There were compiled 109 tables which analyze the pit-scale data on the basis of the various items of information obtained.

Table No. 5 shows the number and percentage of violations of weight and dimension restrictions of this State as shown by the pit-scale operations.

TABLE NO. 5

Number and Percent of Various Type Vehicles Exceeding Nevada Legal Limitations, Recorded at Three Pit Scale Stations in the State of Nevada, in a Survey Conducted from April 6, 1936, to April 6, 1937.

	Size Restrictions							
	Width[1] over 96 inches		Height[2] over thirteen and one-half feet		Length[2] over sixty feet		Tandem axle spacing under forty-two inches	
Type of vehicle	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.[3]
Single unit trucks	95	4.22	0	0.00	0	0.00	16	8.47
Tractor trucks and semitrailers	70	17.37	1	0.25	2	0.50	16	12.50
Trailers	51	16.89	1	0.33	9	2.98	3	3.45
Busses	30	4.44	0	0.00	0	0.00	0	0.00
Totals	246	6.78	2	0.06	11	0.29	35	8.66

	Gross Weight				Gross Weight Limits[4]									
	Over 600 pounds per inch of tire width		Over[5] 18,000 pounds per axle		Four-wheel single units over 25,000 lbs.		Six-wheel single units over 38,000 lbs.		Four-wheel tractor-truck and two-wheel semitrailer over 38,000 lbs.		Four-wheel tractor-truck and four-wheel semitrailer over 38,000 lbs.		Six-wheel tractor-truck and four-wheel semitrailer over 38,000 lbs.	
Type of vehicle	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Single unit trucks	36	1.44	----	------	32	1.43	13	2.90						
Tractor trucks and semitrailers	0	0.00	----	------	----	------	----	------	6	4.96	78	69.03	136	86.08
Trailers	6	2.46	----	------	12	6.25	6	3.12						
Busses	1	0.17	24	4.09	30	4.66								
Totals	43	0.12	24	4.09	74	2.41	19	2.97	6	4.96	78	69.03	136	86.08

[1] Limited to eight miles per hour.

[2] No restrictions since 1937.

[3] Only dual axle vehicles used in computing percentages.

[4] No distinction made between pneumatic and solid tires.

[5] Applicable to passenger carrying vehicles only.

Table No. 6 shows number and percentage of violations that would occur under present operating conditions if the code of uniform truck and bus regulations were adopted.

TABLE NO. 6

Number and Percent of Various Type Vehicles Exceeding the Proposed Uniform Limitations, Recorded at Three Pit Scale Stations in the State of Nevada, in a Survey Conducted from April 6, 1936, to April 6, 1937.

	Size Restrictions						Gross Weight			
Type of vehicle	Width over ninety-six inches		Height over twelve and one-half feet		Length[1] over 35 feet for single units and over 45 feet for trucks with trailers		Over 16,000 pounds per axle for high pressure tires		Over 18,000 pounds per axle for low pressure tires	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Single unit trucks	95	4.22	9	0.39	3	0.13	12	1.92	49	2.44
Tractor trucks and semitrailers	70	17.37	12	3.01	283	70.93	1	2.44	40	12.86
Trailers	51	16.89	1	0.33	249	82.50	0	0.00	1	0.47
Busses	30	4.44	0	0.00	0	0.00	0	0.00	24	4.09
Totals	246	6.78	22	0.60	535	14.54	13	1.91	114	3.65

[1] Tractor trucks and semitrailers considered single unit.

Of the commercial vehicles weighed at the pit scale stations 20 percent of the truck and trailer combinations, and 23 percent of tractor-truck and semitrailers were found to be in excess of the maximum allowable gross weight using the formula $750 (L + 40)$.

Due to the small number of commercial vehicles falling within the 18 foot group no attempt is being made at this time to determine the percentage of violations based on the $650 (L + 40)$ formula.

AUTOMATIC RECORDERS

The State has purchased and placed in operation eleven automatic traffic recorders of the electric eye type and one road strip type.

These recorders are located as follows:

(1) No. 101, on U S 40 between Sparks and Vista.

(2) No. 106, on S R 59 near the south city limits of Lovelock.

(3) No. 107, on U S 40 immediately east of east city limits of Elko.

(4) No. 103, on S R 46 approximately one-half mile south of south city limits of Elko.

(5) No. 105, on U S 50 near east city limits of Fallon.

(6) No. 108, on U S 93 one-half mile north of McGill.

(7) No. 109, on U S 93 one-half mile south of limits of East Ely.

(8) No. 111, on U S 6, one mile east of east limits of Tonopah.

(9) No. 112, on S R 3 one-half mile west of west limits of Tonopah.

(10) No. 102, on U S 91 at southwest city limits of Las Vegas.

(11) No. 110, on U S 93 and 466 approximately one mile southeast of Las Vegas city limits.

(12) No. 113, on U S 91 approximately one and one-half miles northeast of limits of North Las Vegas.

Recorder No. 101, east of Sparks, was installed on October 27, 1936, and has been in continuous use since, with the exception of operation failures. The other recorders have been placed in operation subsequent to that time, but all, with the exception of No. 113, northeast of Las Vegas, have been installed for more than a year's time.

Actuated by the breaking of a beam of light thrown across the road, these recorders show the day, hour, and hourly total of passing vehicles by stamping the information on paper tape. The tapes are collected weekly and record cards filled in showing the hourly, daily, and weekly total. Curves are drawn showing monthly and seasonal fluctuations. Thus a continuous traffic record is obtained for each hour of the year.

These records constitute a complete analysis, with exception of direction of travel and type of vehicle, of traffic flow, peaks, trends, annual 24-hour averages, annual increase or decrease, etc.

Table No. 7 shows length of time each recorder has been in operation and distribution of the 4,101,792 vehicles recorded among the various counters up to June 30, 1938.

TABLE NO. 7

Table Showing Length of Time of Operation of Automatic Recorders and Traffic Recorded

Automatic recorder number	Vehicles counted	Installation date
101	749,847	October 27, 1936, to June 30, 1938, inclusive
102	627,964	February 17, 1937, to June 30, 1938, inclusive
103	116,623	December 27, 1936, to June 30, 1938, inclusive
104	198,722	*November 9, 1936, to December 23, 1937, inclusive
105	646,480	March 21, 1937, to June 30, 1938, inclusive
106	72,703	April 25, 1937, to June 30, 1938, inclusive
107	327,976	May 5, 1937, to June 30, 1938, inclusive
108	140,798	May 28, 1937, to June 30, 1938, inclusive
109	154,865	May 27, 1937, to June 30, 1938, inclusive
110	690,606	March 31, 1937, to June 30, 1938, inclusive
111	81,366	April 1, 1937, to June 30, 1938, inclusive
112	185,149	July 30, 1937, to June 30, 1938, inclusive
113	108,693	February 4, 1938, to June 30, 1938, inclusive
Total	4,101,792	

*I. B. M. Recorder installed November 9, 1936, operated until May 14, 1937.

Paver-Sills Portable Traficounter installed August 4, 1937, operated intermittently until December 23, 1937. Moved to Station 113 near Las Vegas.

Table No. 8 shows the monthly distribution of traffic at each recorder and average annual 24-hour totals.

TABLE NO. 8

Automatic Recorder Twenty-four Hour Averages

Recorder number	June 1937	July 1937	Aug. 1937	Sept. 1937	Oct. 1937	Nov. 1937	Dec. 1937	Jan. 1938	Feb. 1938	Mar. 1938	April 1938	May 1938	24-hour annual average
101	1,636	1,793	1,885	1,635	1,489	1,369	1,067	955	819	993	1,291	1,442	1,365
102	1,942	1,806	1,797	1,686	1,344	1,231	1,078	1,037	987	750	1,281	1,483	1,368
103	295	354	366	311	256	232	164	143	139	172	273	339	254
105	1,546	1,464	1,592	1,574	1,410	1,431	1,289	1,219	1,297	1,329	1,542	1,542	1,436
106	186	224	214	220	192	161	149	133	134	156	175	195	178
107	1,110	1,230	1,291	1,011	747	611	470	389	347	461	629	749	754
108	442	481	505	458	360	317	240	198	176	214	321	384	341
109	408	425	409	436	399	379	345	305	206	253	427	444	370
110	1,797	1,681	1,754	1,717	1,436	1,389	1,251	1,228	1,150	1,189	1,605	1,617	1,485
111	242	214	185	174	183	159	162	140	99	129	162	200	171
112	532	533	478	448	404	387	374	323	303	313	416	534	420

It is obviously impossible to include the hundreds of tables and vast amount of data that have been collected, compiled, and analyzed by the traffic division of the planning survey. However, these tables are on file and available for reference.

FINANCIAL SURVEY

The financial survey was set up to include four phases or separate surveys that are closely related in nature.

Due to the varied character of the work involved in the financial survey this study was made a separate unit of the State-wide highway planning survey. The work was under the direct supervision of an assistant manager who was responsible directly to the manager.

All work in this group has been under close supervision of the United States Department of Agriculture, Bureau of Public Roads. In addition to the Bureau Manager a special representative has assisted with the work and has made regular monthly visits to review the work being done. Representatives working out of the Washington office have also assisted.

FISCAL SURVEY

The fiscal survey is principally concerned with the study and analysis of the highway income and expenditures of all units of government within the State. The amounts contributed by the highway users in accordance with place of residence and in accordance with their activities and amounts from all other sources are other points studied. For purposes of comparison the total income and expenditures for all purposes grouped into several appropriate classifications have been secured.

Preliminary work was undertaken on September 11, 1936. The first step was to study the tax structure of the State, counties, incorporated cities and towns, unincorporated cities and towns, school districts, and other special districts. State statutes together with a number of printed compilations were reviewed. The preliminary study also required the interviewing of the various department officials of the State, and of the local minor political subdivisions.

As the latest possible information would be of greatest value the fiscal year 1935-1936 was selected for the survey.

It was thought at first that sufficient data for the counties would be available from the annual published reports of the seventeen County Auditors. After the reports were obtained it was found that the method of reporting was not uniform, in many instances receipts from more than one source were combined so that identification was impossible. In order to obtain the required data a clerk was assigned to make personal calls at the seat of government for each of the taxing units. All data for special districts and cities and towns had to be compiled from the books of the respective units, as no regularly issued reports were available. It was quite important to keep the work under close supervision due to numerous problems involved, accordingly the State was divided into three districts, and calls were made at all units within the district. All data were compiled on special forms and preliminary analysis made for each unit within a district prior to continuing the survey in the other districts.

In the year studied a total of 411 governmental or separate taxing units were operating. These are classed as follows:

State	1
Counties	17
Incorporated cities classed as urban	10
Incorporated cities classed as rural	2
Unincorporated cities 2,500 or more in population	3
School districts	349
Unincorporated towns	23
Utility district (rural)	1
Drainage district	1
Water conservation districts	2
Irrigation districts	2

Upon the completion of the study made of the tax structure of the various taxing units a preliminary report was prepared. This report covers the details of the work, the interpretation of the items involved and a complete brief of the revenue measures with the legal reference for each of the above units. This compilation is considered the only complete compilation of this nature.

One of the objectives of the fiscal study is the collection of accurate information concerning the debt status of the several governmental units within the State. With these data available it will be possible to compare the theoretical liability of residents of various population groups for highway indebtedness with that for other debt.

TABLE NO. 9

Fiscal Survey Showing Receipts of the State of Nevada for the Fiscal Year Ending June 30, 1936 (1)

Receipts	Receipts				Specific Commitments		Currently available for State purposes
	Amount	Total	Percent		For State debt	For other units	
Property taxes (2)	$1,272,043	$1,272,043	15.4	15.4	$94,638	$238,163	$939,242
Motor vehicle imposts		1,496,223		18.1			
Fuel tax	1,000,967		12.1			(3) 5,379	995,588
Registration fees	262,987		3.2		50,000	5,386	207,601
Title transfers	11,045		0.1				11,045
Carrier licenses	221,224		2.7				221,224
Other special imposts		607,873		7.4			
Petroleum products inspection fees	15,823		0.2				15,823
Gambling licenses (4)	235,248		2.9			171,136	64,112
Dance hall licenses (5)	1,342		(6)			956	386
State liquor licenses	15,942		0.2		3,429		12,513
State liquor stamp tax	162,784		2.0		22,784	100,000	40,000
Insurance companies' premium tax	30,701		0.4				30,701
Insurance companies' licenses	24,691		0.3				24,691
Corporation fees	47,478		0.6			21,075	26,403
Water distribution tax	16,968		0.2				16,968
Sheep, livestock and apiary inspection taxes	20,382		0.2				20,382
Fish and game and deer tag licenses (7)	24,875		0.3			17,078	7,797
Miscellaneous special imposts	11,639		0.1				11,639
Other general revenue		195,149		2.4			
Interest on school and University land contracts	22,984		0.3			18,976	4,008
Interest on University Irreducible Fund	2,002		(6)				2,002
Interest on Permanent School Fund	142,198		1.7			142,198	
Interest on University Endowment	5,112		0.1				5,112
Miscellaneous general revenue	22,853		0.3				22,853
Total imposts and general revenue		3,571,288		43.3	170,851	720,347	2,680,090
Federal aids and grants (8)		4,384,856		53.1			
Highways—							
Regular	690,233		8.4				690,233
Public works	2,000,551		24.2				2,000,551
Public lands	163,764		2.0				163,764
W. P. H.	1,003,421		12.2				1,003,421
W. P. grade crossing	232,055		2.8				232,055
Education—							
Morrill-Nelson	70,000		0.8				70,000
Vocational education (9)	30,607		0.4			30,607	
Other	55		(6)				55

Public Welfare—							
Social security	27,634		0.3				27,634
Industrial rehabilitation	5,000		0.1				5,000
Employment service	10,105		0.1				10,105
Adams	15,000		0.2				15,000
Hatch-Bankhead-Jones	15,615		0.2				15,615
Purnell	60,000		0.7				60,000
Smith-Lever-Bankhead-Jones	27,852		0.3			27,852	
Capper-Ketcham	20,524		0.3				20,524
Federal cooperative	10,000		0.1				10,000
Other	2,440		(*6*)				2,440
Borrowings—							
Bonded		295,000		3.6			
Highways	19,000		0.2				19,000
Public welfare	234,000		2.9				234,000
Government	42,000		0.5				42,000
Total		4,679,856				58,459	4,621,397
Total receipts	8,251,144	8,251,144	100.0	100.0	170,851	778,806	7,301,487
Decrease in balances							
Grand total	8,251,144	8,251,144					

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) Data from State Controller's records and University of Nevada. Highway Federal aid from State Highway Department records.

(*2*) Includes net proceeds of mines. Current and delinquent taxes are not separable. Of the total, $8,837 is a delinquent collection from prior years' specific property tax levy for highways.

(*3*) State aid to counties to cover County-State highway bond redemption and interest. Interest due in July. County payments show $14,272; $5,379 is part payment only. Other payments made by State in June 1935 shown as receipts by counties for fiscal year July 1, 1935, to June 30, 1936.

(*4*) Includes county and city or town share as determined by law.

(*5*) Includes counties' share as determined by law.

(*6*) Less than ½%.

(*7*) Includes counties' share as provided by law. Commitments for counties include fines not separable from receipts.

(*8*) National Forest Service receipts are credited as a direct Federal aid receipt of the counties.

(*9*) Payments to school districts $30,792 for this period. The amount of $185 was taken from previous balances.

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TABLE NO. 10

Fiscal Survey Showing Receipts of the Counties of Nevada for the Year Ending June 30, 1936

Receipts	Receipts		Specific Commitments		Currently available for county purposes
	Amount	Percent	For county debt	For other units	
Property taxes (1)	$2,617,089	80.6	$145,790	$824,822	$1,646,477
Other special imposts—					
Poll tax (2)	43,028	1.3			43,028
Liquor licenses (3)	14,921	0.5			14,921
General business licenses	72,176	2.2			72,176
Other permits and licenses	2,296	0.1		2,161	135
Other general revenue—					
County officers' fees	206,058	6.3			206,058
Tax penalties	24,948	0.8			24,948
Public service profit (4)	7,485	0.2			7,485
Miscellaneous revenue	3,590	0.1			3,590
Total imposts and general revenue	2,991,591	92.1	145,790	826,983	2,018,818
State-administered revenues—					
Subventions—					
Highways—					
Motor vehicle fuel tax (5)	14,272	0.5	11,500		2,772
Public welfare—					
Farm Bureau (6)	36,875	1.1			36,875
Shared taxes—					
Public welfare—					
Farm Bureau	19,683	0.6			19,683
Fish and game licenses	17,078	0.5			17,078
General Fund—					
Dance hall licenses	956	(7)			956
Gambling licenses	66,162	2.0			66,162
Motor vehicle registration fees	5,053	0.2			5,053
Refund relief loan property tax (8)	3,694	0.1			3,694
Federal aid—					
P. W. A. grant—					
Government (9)	1,218	(7)			1,218
National forest receipts—					
Highways	7,974	0.3			7,974
Education	7,969	0.3		7,969	
Borrowings—					
Bonds—					
Public welfare	40,000	1.2			40,000
Government	25,300	0.8			25,300

Short term— Highways	9,000	0.3	....	....	9,000
Total other revenues	255,234	7.9	11,500	7,969	235,765
Total receipts	3,246,825	100.0	157,290	834,952	2,254,583
Decrease in balances					
Grand total	3,246,825				

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) Includes net proceeds of mines.
(*2*) Poll tax collected in rural areas.
(*3*) County liquor license levied by counties on establishments in rural areas.
(*4*) Profits from county-operated public utilities in Churchill and Mineral Counties.
(*5*) For Douglas and Lyon Counties only.
(*6*) Includes $30,114 Federal aid.
(*7*) Less than ½%.
(*8*) Refund of State property tax to nonparticipating counties on relief loans made to the counties.
(*9*) Lyon County courthouse

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TABLE NO. 11

Fiscal Survey Showing Receipts of All Incorporated Cities of Nevada, for the Year Ending June 30, 1936, or for Fiscal Years Ending During the Calendar Year 1936 (*1*)

Receipts	Receipts		Specific Commitments		Currently available for local purposes
	Amount	Percent	For local debt	For other units	
Property taxes—					
General (*2*)	$559,083	47.2	$152,137	....	$406,946
Special assessments	91,208	7.7	68,347	....	22,861
Motor vehicle imposts—					
Fuel tax (*3*)	3,492	0.3	....	....	3,492
Other special imposts—					
Liquor licenses (*4*)	9,721	0.8	....	....	9,721
Poll tax (*5*)	28,583	2.4	....	....	28,583
Business licenses	233,828	19.7	....	....	233,828
Miscellaneous special imposts	21,323	1.8	....	....	21,323
Other general revenue—					
Fees and fines	32,207	2.7	....	....	32,207
Other revenue	886	0.1	....	....	886
Public service profit	21,765	1.8	....	....	21,765
Total local imposts and general revenue	1,002,096	84.5	220,484	....	781,612
State-administered revenues—					
Shared taxes—					
General Fund—					
Gambling licenses	96,772	8.2	....	....	96,772
County-administered revenues—					
Shared taxes—					
Highways—					
County Road Fund—					
Property taxes	11,287	0.9	....	....	11,287
Federal aid—					
P. W. A. grant—					
Welfare	23,257	2.0	....	....	23,257
Borrowings—					
Bonds—					
Welfare	27,000	2.3	....	....	27,000
Short term—					
Welfare	20,000	1.7	....	....	20,000
General Fund	5,000	0.4	....	....	5,000
Total other revenues	183,316	15.5	....	....	183,316
Total receipts	1,185,412	100.0	220,484	....	964,928
Decrease in balances					
Grand total	1,185,412				

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) Population based on 1930 U. S. Census. See Table FS–1.
(*2*) Current and delinquent taxes are not separable.
(*3*) A one cent per gallon levy by Carson City only.
(*4*) Impossible to segregate from business licenses in all cases.
(*5*) Poll tax collected within corporate limits.

FS–9a

TABLE NO. 12

Fiscal Survey Showing Receipts of All Special Districts of Nevada for the Year Ending June 30, 1936, or for Fiscal Years Ending During the Calendar Year 1936 (*1*)

Receipts	Receipts		Specific Commitments		Currently available for local purposes
	Amount	Percent	For local debt	For other units	
Property taxes—					
General (*2*)	$1,290,609	39.7	$272,016	....	$1,018,593
Other special imposts—					
Liquor licenses (*3*)	10,424	0.3	....	....	10,424
Business licenses (*4*)	13,375	0.4	....	....	13,375
Other general revenue—					
Fees and fines	371	(5)	....	....	371
Other revenue	11,471	0.4	....	....	11,471
Public service profit	10,650	0.3	....	....	10,650
Total local imposts and general revenue	1,336,900	41.1	272,016	....	1,064,884
State-administered revenues—					
Subventions—					
Education—					
District school apportionment	510,566	15.7	....	....	510,566
Shared taxes—					
General Fund—					
Gambling licenses	8,202	0.3	....	....	8,202
County-administered revenues—					
Subventions—					
Education—					
County school apportionment	830,020	25.5	....	....	830,020
Special aids—					
Education—					
Aid to districts (*6*)	600	(5)	....	....	600
Federal aid—					
P. W. A. grant—					
Education (*7*)	81,276	2.5	....	....	81,276
Borrowings—					
Bonds—					
Highways	12,060	0.4	....	....	12,060
Education	408,000	12.5	....	....	408,000
Welfare	52,831	1.6	....	....	52,831
Short term—					
Education	324	(5)	....	....	324
Welfare	13,184	0.4	....	....	13,184
Total other revenues	1,917,063	58.9	....	....	1,917,063

Total receipts	3,253,963	100.0	272,016	....	2,981,947
Decrease in balances					
Grand total	3,253,963				

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) Includes 349 school districts, 37 special districts in 23 unincorporated towns, 5 drainage, irrigation or water conservation districts, and 1 rural electrical improvement district.
(*2*) Current and delinquent taxes are not separable.
(*3*) Not separable from business licenses in all cases.
(*4*) Levied by unincorporated towns.
(*5*) Less than ½%.
(*6*) Emergency aid to two Washoe County school districts.
(*7*) For school building construction only.

FS–9a–6

TABLE NO. 13

Fiscal Survey Showing Per Capita Receipts from Taxes, Imposts and General Revenue for the State, Counties, and Local Units of Government in Nevada During the Year Ending June 30, 1936, or for Fiscal Year Ending During Calendar Year 1936 (*1*)

	PROPERTY TAXES			OTHER		
Unit of Government	General	Special assessments	Motor vehicle imposts	Special imposts	General revenues	Total
State	$13.60	....	$15.99	$6.50	$2.08	$38.17
Counties	27.97	....	....	1.42	2.59	31.98
Special districts	13.80	....	....	0.25	0.24	14.29
Incorporated places having a population of—						
1,000 or less (*2*)	14.89	....	....	3.11	4.00	22.00
1,001 to 2,500	8.87	$2.19	0.46	4.75	2.45	18.72
2,501 to 5,000	11.26	1.30	....	5.49	0.98	19.03
Las Vegas (5,165)	13.54	3.35	....	10.27	1.85	29.01
Reno (18,529)	15.02	2.33	....	7.58	0.55	25.48
Total	61.34	0.97	16.03	11.31	5.50	95.15
RECAPITULATION						
State	$13.60	....	$15.99	$6.50	$2.08	$38.17
Counties	27.97	....	....	1.42	2.59	31.98
Local governments	19.77	$0.97	0.04	3.39	0.83	25.00
Grand total	61.34	0.97	16.03	11.31	5.50	95.15

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) For data upon which per capita amounts are based, see Table FS–10.

(*2*) Carlin and Wells.

FS–10a

TABLE NO. 14

Fiscal Survey Showing Disbursements of the State of Nevada for the Fiscal Year Ending June 30, 1936

Disbursements	Amount	Percent	Per capita (*1*)
Net direct expenditures—			
Highways	$5,438,265	69.8	$58.13
Education	361,877	4.6	3.86
Public welfare and services	818,384	10.5	8.75
Government	278,795	3.6	2.98
Total net direct expenditures	6,897,321	88.5	73.72
Debt retirement—			
Bonds—			
Highways	50,000	0.6	0.53
Education	14,000	0.2	0.15
Public welfare and services	33,000	0.4	0.35
Government	24,000	0.3	0.26
Aids and grants paid—			
Subventions—			
Highways—			
Motor vehicle fuel tax	5,379	0.1	0.06
Education—			
District school apportionment (*2*)	520,941	6.7	5.57
Public welfare—			
Farm Bureau (*3*)	34,401	0.4	0.37
Shared taxes—			
Public welfare—			
Farm Bureau–State property tax	18,919	0.2	0.20
Fish and game licenses	17,078	0.2	0.18
General Fund—			
Dance hall licenses	956	(*4*)	0.01
Gambling licenses	171,136	2.2	1.83
Motor vehicle registration fees	5,386	0.1	0.06
Refund relief loan property tax (*5*)	3,694	0.1	0.04
Total disbursements	7,796,211	100.0	83.33
Increase in balances	454,933	......	4.86
Grand total	8,251,144	......	88.19

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) State population based on 1930 U. S. Census data. State population of 93,558 used. See Table FS–1.

(*2*) Includes $30,792 Federal vocational educational aid.

(*3*) Includes $30,114 Federal aid to County Farm Bureau.

(*4*) Less than ½%.

(*5*) Refund of State property tax to nonparticipating counties on relief loans made to the counties.

FS–7b

TABLE NO. 15

Fiscal Survey Showing Disbursements of the Counties of Nevada for the Fiscal Year Ending June 30, 1936

Disbursements	Amount	Percent	Per capita (*1*)
Net direct expenditures—			
Highways	$423,726	13.4	$4.53
Education	50,148	1.6	0.54
Public welfare and services	929,010	29.3	9.93
Government	757,410	23.9	8.09
Total net direct expenditures	2,160,294	68.2	23.09
Debt retirement—			
Bonds—			
Highways	68,000	2.1	0.73
Education	2,000	0.1	0.02
Welfare	15,000	0.5	0.16
Services	5,000	0.2	0.05
Government	48,500	1.5	0.52
Short term—			
Public welfare	28,178	0.9	0.30
Aids and grants paid—			
Subventions—			
Education—			
County school apportionment	826,529	26.1	8.83
Shared taxes—			
Highways—			
County road fund property tax	12,077	0.4	0.13
Special aids—			
Education—			
Aid to school districts	600	(*2*)	0.01
Total disbursements	3,166,178	100.0	33.84
Increase in balances	80,647	--------	0.86
Grand total	3,246,825	--------	34.70

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) State population of 93,558 used. See Table FS–1.

(*2*) Less than ½%.

FS–8b

TABLE NO. 16

Fiscal Survey Showing Disbursements of All Incorporated Cities of Nevada for the Year Ending June 30, 1936, or for Fiscal Years Ending During the Calendar Year 1936 (*1*)

Disbursements	Amount	Percent	Per capita
Net direct expenditures—			
Highways	$190,410	16.1	$4.37
Education	2,159	0.2	0.05
Public welfare and services	583,466	49.2	13.40
Government	160,137	13.5	3.68
Total net direct expenditures	936,172	79.0	21.50
Debt retirement—			
Bonds—			
Highways	50,919	4.3	1.17
Welfare	98,146	8.3	2.25
Services	51,000	4.3	1.17
Government	43,100	3.6	0.99
Short term—			
Government	5,730	0.5	0.13
Total disbursements	1,185,067	100.0	27.21
Increase in balances	345	--------	0.01
Grand total	1,185,412	--------	27.22

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) Population based on 1930 U. S. Census data. See Table FS–1.

FS–9b

TABLE NO. 17

Fiscal Survey Showing Disbursements of All Special Districts of Nevada, for the Year Ending June 30, 1936, or for Fiscal Year Ending During the Calendar Year 1936 (*1*)

Disbursements	Amount	Percent	Per capita (*2*)
Net direct expenditures—			
Highways	$24,749	0.9	$0.26
Education	2,392,989	83.9	25.58
Public welfare and services	180,100	6.3	1.92
Government	1,440	0.1	0.02
Total net direct expenditures	2,599,278	91.2	27.78
Debt retirement—			
Bonds—			
Education	194,473	6.8	2.08
Welfare	25,250	0.9	0.27
Services	11,595	0.4	0.12
Short term—			
Education	19,783	0.7	0.22
Total disbursements	2,850,379	100.0	30.47
Increase in balances	403,584	-------	4.31
Grand total	3,253,963	-------	34.78

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) Includes 349 school districts, 37 special districts in 23 unincorporated towns, 5 drainage, irrigation, or water conservation districts, and 1 rural electrical improvement district.

(*2*) Population by districts not available. State population of 93,558, as adjusted from 1930 census, used to supply a comparable per capita figure for various districts.

FS–9b–6

TABLE NO. 18

Fiscal Survey Showing Per Capita Net Direct Expenditures by the Several Units of Government of Nevada for All Purposes for the Year Ending June 30, 1936, or for Fiscal Year Ending During the Calendar Year 1936 (*1*)

Unit of Government	Highways	Education	Public welfare and services	General government	Total
State	$58.13	$3.86	$8.75	$2.98	$73.72
Counties	4.53	0.54	9.93	8.09	23.09
Special districts	0.26	25.58	1.92	0.02	27.78
Incorporated places having a population of—					
1,000 or less (*2*)	5.71	......	6.99	3.20	15.90
1,001 to 2,500	3.68	......	9.91	5.83	19.42
2,501 to 5,000	4.76	0.03	10.56	2.65	18.00
Las Vegas (5,165)	9.19	0.36	19.87	3.80	33.22
Reno (18,529)	2.98	......	15.18	3.39	21.55
Total	64.96	30.00	26.84	12.80	134.60
RECAPITULATION					
State	$58.13	$3.86	$8.75	$2.98	$73.72
Counties	4.53	0.54	9.93	8.09	23.09
Local governments	2.30	25.60	8.16	1.73	37.79
Grand total	64.96	30.00	26.84	12.80	134.60

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(*1*) For data upon which per capita amounts are based.
(*2*) Carlin and Wells.

FS–12a

TABLE NO. 19

Fiscal Survey Showing Area, Population, and Assessed Valuation of Nevada by Population Groups

Population group	Number of places (1)	Land area square miles (2)	Population (3)			Assessed Valuation (4)		
			Number	Percent	Persons per square mile	Amount in units of $1,000	Percent	Per capita
Unincorporated areas—								
Rural	----	109,765	41,986	44.9	0.4	147,785	77.9	2,956
2,500 and over	3	7	8,017	8.5	1,145.3	(5)	(5)	(5)
Incorporated places having a population of 1,000 or less (6)	2	13	1,480	1.6	113.8	2,292	1.2	1,549
Total rural areas	5	109,785	51,483	55.0	0.5	150,077	79.1	2,915
Incorporated places having a population of—								
1,001 to 2,500	5	7	7,611	8.2	1,087.3	5,301	2.8	696
2,501 to 5,000	3	11	10,770	11.5	979.1	8,539	4.5	793
Las Vegas (5,165)	1	14	5,165	5.5	368.9	4,500	2.4	871
Reno (18,529)	1	4	18,529	19.8	4,632.2	21,323	11.2	1,151
Total urban areas	10	36	42,075	45.0	1,168.7	39,663	20.9	943
Grand total	15	109,821	93,558	100.0	0.9	189,740	100.0	2,028

NOTE—*Italic figures* in parentheses refer to reference notes at bottom of table.

(1) Based on 1930 U. S. Census data showing 12 incorporated places with the addition of Boulder City, McGill, and Tonopah which are unincorporated.

(2) Total land area from 1930 U. S. Census data. City area provided by inventory data of the State-wide Highway Planning Survey.

(3) Based on 1930 Census data. Census data for entire precinct of McGill used and the population of Tonopah precinct and Boulder City each considered as having a population of 2,500 or more.

(4) State equalized valuation on forced sale market value. Assessment of 1935. Includes all assessable property, including Assessor's personal property tax roll.

(5) Not segregated from other unincorporated areas. Includes Boulder City, McGill, and Tonopah.

(6) Carlin and Wells.

FS–1

MOTOR VEHICLE ALLOCATION STUDY

The motor vehicle allocation study was devised to obtain data relative to Nevada-owned motor vehicles operated in 1936. These data cover the imposts paid, such as registration fees, carrier licenses, and fuel tax, with all data prepared by vehicle type and age in accordance with the situs of ownership. The object is to classify the data by rural and urban areas for the State and for the urban areas by population groupings. Other allied data were also obtained and will be utilized.

The information was obtained by the use of a questionnaire post card. These cards were distributed in conjunction with the issuance of the registration plates for 1937 and by mailing. Tabulations of the data from the returned and usable cards were made by mechanical tabulating methods wherever possible.

In the distribution of the questionnaire a considerable amount of work was carried on by the WPA force assigned to this phase of the survey.

In order to check and expand the sample data it was necessary to prepare tabulations of the data on file in the office of the State Motor Vehicle Commissioner, and WPA labor was utilized almost exclusively in this work.

As stated previously, the principal objective in this study was to analyze the information for Nevada vehicles. In order to expand the sample data it was necessary to set up an item for out-of-State vehicles. This item represents vehicles owned by other than Nevada residents, that were operated in this State for only a small part of the year studied. The final tables for this study are in the process of completion and for comparative purposes the following tables are published:

Table No. 20, motor vehicles registered in Nevada in 1936.

Table No. 21, persons per privately-owned Nevada vehicles registered in Nevada in 1936.

Table No. 22, registered privately-owned Nevada vehicles classified according to year-models, average number of miles traveled by vehicles in each year-model group, and average miles per gallon of gasoline consumed by vehicles in each year-model group in 1936.

TABLE NO. 20

Number of Motor Vehicles Registered in Nevada in 1936[1]

Owned by residents of—	Number of Motor Vehicles[2] Passenger cars[3]	Busses	Trucks[4]	Motorcycles	Others[5]	Total	Trailers full and semi	Total number of vehicles
Unincorporated areas—								
Rural	9,388	7	2,540	32	----	11,967	202	12,169
2,500 and over[6]	2,435	------	315	16	----	2,766	56	2,822
Incorporated places having a population of 1,000 or less[7]	412	------	117	1	----	530	19	549
Total rural areas	12,235	7	2,972	49	----	15,263	277	15,540
Incorporated places having a population of—								
1,001 to 2,500	2,572	16	1,077	9	----	3,674	181	3,855
2,501 to 5,000	2,798	------	715	6	----	3,519	98	3,617
Las Vegas (5,165)	2,881	29	495	15	----	3,420	143	3,563
Reno (18,529)	6,893	7	1,442	32	----	8,374	201	8,575
Total urban areas	15,144	52	3,729	62	----	18,987	623	19,610
Total rural and urban areas	27,379	59	6,701	111	----	34,250	900	35,150
Out-of-State vehicles[8]	3,362	29	979	4	----	4,374	160	4,534
Total private vehicles	30,741	88	7,680	115	----	38,624	1,060	39,684
Public vehicles—								
State	160	------	178	------	1	339	14	353
Local	67	[9]29	210	8	10	324	12	336
Federal[10]	89	11	439	1	----	540	22	562
Grand total	31,057	128	8,507	124	11	39,827	1,108	40,935

[1] Data from registration records of State Motor Vehicle Commissioner for the calendar year 1936. Data in accordance with Bureau Form MVR-1 for 1936, with exception of busses, which were reported as 129 and included 41 taxicabs and excluded 40 publically-owned busses.

[2] Situs of distribution based on motor vehicle allocation returned questionnaires for passenger cars. All other vehicles distributed as to situs on basis of registration records.

[3] Includes taxicabs and privately-owned ambulances and hearses.

[4] Includes pickups and tractor trucks.

[5] Publicly-owned ambulances and fire trucks.

[6] Boulder, McGill and Tonopah.

[7] Carlin and Wells.

[8] Out-of-State vehicle owners, resident of Nevada short period only.

[9] School district-owned busses.

[10] Reported by U. S. Department of Agriculture, Bureau of Public Roads, Table MV-7, as of December 31, 1936.
MVA-1

TABLE NO. 21

Persons Per Privately-Owned Nevada Vehicle Registered in Nevada in 1936[1]

Owned by residents of—	Population	PERSONS PER VEHICLE Passenger cars[2]	Busses	Trucks[3]	Motorcycles[4]	Total number of vehicles
Unincorporated areas—						
Rural	41,986	4.5	5,998.0	16.5	--------	3.5
2,500 and over[5]	8,017	3.2	-----------	25.5	--------	2.9
Incorporated places having a population of 1,000 or less[6]	1,480	3.6	-----------	12.6	--------	2.7
Total rural areas	51,483	4.2	7,354.7	17.3	--------	3.3
Incorporated places having a population of—						
1,001 to 2,500	7,611	3.0	475.7	7.1	--------	2.0
2,501 to 5,000	10,770	3.8	-----------	15.1	--------	3.0
Las Vegas (5,165)	5,165	1.8	178.1	10.4	--------	1.5
Reno (18,529)	18,529	2.7	2,647.0	12.8	--------	2.2
Total urban areas	42,075	2.8	809.1	11.3	--------	2.2
Grand total	93,558	3.4	1,585.7	14.0	813.5	2.4

[1] Data from registration records of State Motor Vehicle Commissioner for the calendar year 1936.

[2] Includes taxicabs and privately-owned ambulances and hearses.

[3] Includes pickup and tractor trucks.

[4] Not segregated by population groups.

[5] Boulder, McGill, and Tonopah.

[6] Carlin and Wells.

TABLE NO. 22

Registered Privately-Owned Nevada Vehicles Classified According to Year Models, Average Number of Miles Traveled by Vehicles in Each Year-Model Group and Average Miles Per Gallon of Gasoline Consumed by Vehicles in Each Year-Model Group in 1936

Year Model	Registered Vehicles				Average Number of Miles Traveled[1]		Average Miles Per Gallon of Gasoline Consumed[1]	
	Cars		Trucks					
	Number	Percent	Number	Percent	Cars	Trucks	Cars	Trucks
1936	5,428	19.8	1,168	17.4	11,855.6	12,640.0	16.8	13.9
1935	3,065	11.2	782	11.7	11,176.8	13,635.4	16.9	13.1
1934	2,300	8.4	590	8.8	9,539.5	10,422.0	16.6	13.0
1933	1,319	4.8	211	3.2	9,662.0	10,756.7	16.8	12.6
1932	963	3.5	196	2.9	8,011.2	7,568.8	16.1	14.6
1931	1,914	7.0	460	6.9	7,262.5	6,954.2	16.6	13.8
1930	2,468	9.0	464	6.9	6,114.4	12,537.1	16.5	13.2
1929	3,596	13.1	767	11.4	5,459.8	6,971.2	16.5	15.0
1928	2,312	8.5	345	5.2	4,561.8	8,663.9	16.3	12.3
1927	1,476	5.4	274	4.1	4,178.7	4,260.0	16.3	15.2
1926	1,171	4.3	375	5.6	3,950.0	4,590.3	15.9	16.2
1925	642	2.3	279	4.2	3,558.6	4,110.5	15.8	15.6
1924	345	1.3	239	3.5	2,678.3	2,735.0	16.2	15.4
1923 and older	380	1.4	551	8.2	2,908.6	4,284.2	16.4	17.0
Totals	27,379	100.0	6,701	100.0	8,690.5	10,027.0	16.6	13.9

[1] Prepared from questionnaires returned by vehicle owners.

ROAD USE SURVEY

This phase of the survey is to determine the relative use of the several highway systems by the residents of the State during the year 1936. With this information comparisons may be made with other data compiled in the financial survey and the relationship determined between the use of the highway systems and the contributions made for the support of these systems. The first step in this survey was a sampling process. The information was obtained by personal interviews with a representative number of motor vehicle owners. The data gathered, when expanded, will give the total vehicle miles traveled on each of the highway systems of the State during the year 1936, the source of that travel, classified according to the residence of the vehicle owners, and the purpose of travel.

The road-use survey and the fiscal studies can indicate a possible solution of the question "Are the groups who are paying for the highways obtaining value proportionate to their contributions?"

Considering the sparsely populated areas within the State and the small number of interviews to be taken, coupled with the fact that economy was to be exercised, it was necessary to consider every factor entering the survey so that a representative sample could be obtained, with due consideration given to area, geographical variations, industrial and commercial characteristics, motor vehicle registration, population and places by population class.

The number of interviews to be taken was set at 7 percent of the total passenger car and 13 percent of the total truck registration for the year 1936. Difficulty was experienced in filling the rural quota in some counties. This can be attributed to two reasons, the first in order of importance was the inability of a great number of the vehicle owners, both passenger car and truck, to give sufficient information on their travels; the second reason was the number of out-of-State residents who purchased Nevada licenses and were in the State only a small part of the year.

In endeavoring to obtain the quota of truck interviews by weight class difficulty was experienced as the majority of the heavier trucks were owned by interstate operators and were garaged out of Nevada.

It was also found that a great number of the rural residents own and operate a large number of pickups and light trucks in place of the usual passenger car.

General cooperation from the motor vehicle owners was very good.

A manual of instructions was prepared for use by both the interviewers and the office personnel. Included were cumulative route mileage tables for all designated State routes which included the Federal Aid System, State Improved and State Unimproved, with the respective urban extensions. These were prepared from the logs taken by road inventory parties.

To obtain adequate representation the quota was set for control by year model, weight, and population group. As soon as the interviews were received a preliminary check was made and the interview was then entered on the control sheet for place, weight, and year. Interviewers were kept advised of the models on which an overrun was evident.

The major part of the office work covering the extension and checking of the interviews was done with WPA labor. The preparation of the basic tabulations is now underway and is being done with WPA labor.

Tables are not yet available for publication.

ROAD LIFE STUDY

This phase of the survey is intended to cover a complete inventory of all construction undertaken by the State Highway Department, in order to enable the study of two primary points:

(1) The determination of the probable average service life and rate of retirement for each type of surfacing in order that the future necessary reconstruction can be forecast.

(2) The determination of the annual roadway cost for the several types of surfaces.

The accomplishment of the first objective requires that a summary of the construction, retirement, abandonment, and transfer for each year be made in order that life tables and curves may be computed and the probable average life determined. These tables may be likened to birth, death, and population tables.

In order to reach the second objective, it is necessary to know the probable average life, maintenance cost, the probable salvage value, and the construction cost, as these factors all bear on the annual roadway costs.

From the study of the results to be obtained in these studies it should be possible to make a fair estimate of the present investment in highways.

The studies of the nature covered by this survey are fundamental to a wise operation and extension of the highway facilities. It is planned to continue this study and data will be compiled for each of the succeeding years.

In order to compile the various tables and data, it was necessary to inspect all available construction and maintenance records of the department since its inception. For convenience and for comparative purpose the data have been compiled by State and United States route numbers, and Federal Aid project numbers which have been further broken down by counties for rural and urban areas. This method will permit the preparation of any of the compiled data for any population group or unit desired.

The urban mileage includes the portions of the State Highway System and other city streets constructed by the State Highway Department through the incorporated cities with a population of 1,001 or more. All other cities and towns, whether they are incorporated or unincorporated, are classed as rural for the purpose of this survey.

In the following tables covering miles of highways constructed by years, only the net mileage of the final constructed surface type is given. As an illustration of this point the following is an example: In constructing a section of highway between defined termini there may be four separate operations or steps called stage construction; the first contract calling for the grading and drainage structures, the second contract covering gravel surfacing, the third for applying the bitumen, and the State under a day-labor job mixed and finished the roadway. When all of these operations were completed within the same calendar year only the completed surface type is given as mileage of the section.

In the table of mileages retired, abandoned, or transferred off the system, the following methods were used: retired denotes mileages that have been reconstructed to a higher type of surfacing; abandoned means abandoned in place and this mileage is no longer in service; transferred is used to define the mileage of highways transferred off the designated State Highway System. This may be a transfer to a city or county.

The following tables are included so that comparison may be made of the increased highway construction in both the rural and urban areas:

TABLE NO. 23

ROAD LIFE STUDY—SUMMARY OF RURAL HIGHWAY CONSTRUCTION BY YEARS

Miles Constructed Each Year

Surface type	1919	1920	1921	1922	1923	1924	1925	1926	1927
Graded and drained	12.960	64.739	33.546	16.534	39.588	48.771	25.804	6.014	....
Gravel or stone surfaced	....	50.564	26.470	89.758	121.281	172.364	146.182	316.983	114.450
Mixed bituminous	....	....	....	....	15.566	4.990	10.160	1.136	4.672
Bituminous penetration	....	....	....	....	....	....	....	....	....
Bituminous concrete	....	....	....	....	....	....	....	....	....
Concrete	0.048	7.726	19.792	3.479	....	4.047	5.911	....	3.924
Total	13.008	123.029	79.808	109.771	176.435	230.172	188.057	324.133	123.046

Surface type	1928	1929	1930	1931	1932	1933	1934	1935	1936
Graded and drained	12.521	21.000	16.062	20.166	0.999	15.741	6.283	0.167	
Gravel or stone surfaced	156.194	186.012	160.796	153.773	191.465	86.236	192.227	91.558	152 615
Mixed bituminous	61.216	187.451	207.273	243.265	220.678	232.332	342.464	422.544	264.173
Bituminous penetration	....	....	20.732	5.870	21.185				
Bituminous concrete	....	....	....	9.155	13.718	5.423	0.587		
Concrete	....	....	0.018	0.012	....	0.677	....	....	0.151
Total	229.931	394.463	404.881	432.241	448.045	340.409	541.561	514.269	416.939

RL–7r

Miles Retired, Abandoned or Transferred Each Year

Surface type	1921	1922	1923	1924	1925	1926	1927	1928
Graded and drained	14.990	36.304	24.086	22.502	26.378	37.896	3.924	0.635
Gravel or crushed rock	1.817	1.306	18.818	....	0.023	0.770	....	92.636
Mixed bituminous surface	....	....	....	....	....	....	....	....
Bituminous penetration	....	....	....	....	....	....	....	....
Bituminous concrete	....	....	....	....	....	....	....	....
Portland cement concrete	....	....	....	....	....	....	....	....
Total	16.807	37.610	42.904	22.502	26.401	38.666	3.924	93.271

Surface type	1929	1930	1931	1932	1933	1934	1935	1936
Graded and drained	2.096	3.024	37.380	23.814	23.379	29.382	3.806	7.580
Gravel or crushed rock	217.686	280.309	253.133	289.787	179.293	169.648	387.041	192.839
Mixed bituminous surface	1.443	14.271	11.929	10.179	16.611	58.466	24.723	32.492
Bituminous penetration	....	....	....	....	....	0.435	10.406	
Bituminous concrete	....	....		....	....	....	....	....
Portland cement concrete	0.048	....	9.321	13.968	5.424	0.478	0.167	1.413
Total	221.273	297.604	311.763	337.748	224.707	258.409	426.143	234.324

RL–8r

TABLE NO. 23—*Continued*

Miles Remaining in Service January 1

Surface type	1920	1921	1922	1923	1924	1925	1926	1927	1928
Graded and drained	12.960	77.699	96.255	76.485	91.987	118.256	117.682	85.800	81.876
Gravel or crushed stone	---------	50.564	75.217	163.669	266.132	438.496	584.655	900.868	1015.318
Mixed bituminous	---------	---------	---------	---------	15.566	20.556	30.716	31.852	36.524
Bituminous penetration	---------	---------	---------	---------	---------	---------	---------	---------	---------
Bituminous concrete	---------	---------	---------	---------	---------	---------	---------	---------	---------
Concrete	0.048	7.774	27.566	31.045	31.045	35.092	41.003	41.003	44.927
Widening, graded and drained	---------	---------	---------	---------	---------	---------	---------	---------	---------
Total	13.008	136.037	199.038	271.199	404.730	612.400	774.056	1059.523	1178.645
Total, less widening	13.008	136.037	199.038	271.199	404.730	612.400	774.056	1059.523	1178.645
	1929	1930	1931	1932	1933	1934	1935	1936	1937
Graded and drained	92.762	112.666	125.704	108.490	85.675	78.037	54.938	51.299	43.719
Gravel or crushed stone	1078.876	1047.202	927.689	828.329	730.007	636.950	659.529	364.046	323.822
Mixed bituminous	97.740	283.748	476.750	708.086	918.585	1134.306	1418.304	1816.125	2047.806
Bituminous penetration	---------	---------	20.732	26.602	47.787	47.787	47.352	36.946	36.946
Bituminous concrete	---------	---------	---------	9.155	22.873	28.296	28.883	28.883	28.883
Concrete	44.927	44.879	44.897	35.588	21.620	16.873	16.395	16.228	14.966
Total	---------	---------	---------	---------	---------	---------	---------	0.167	0.167
Widening, graded and drained	1314.305	1488.495	1595.772	1716.250	1826.547	1942.249	2225.401	2313.694	2496.309
Total, less widening	1314.305	1488.495	1595.772	1716.250	1826.547	1942.249	2225.401	2313.527	2496.142

RL–10r

TABLE NO. 24

ROAD LIFE STUDY—SUMMARY OF URBAN HIGHWAY CONSTRUCTION BY YEARS

Miles Constructed Each Year

Surface type	1920	1922	1923	1924	1925	1926	1928	1929	1930	1931	1932	1933	1934	1935	1936
Graded and drained	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	0.263
Gravel or crushed rock	-------	-------	0.791	-------	5.000	1.993	-------	0.096	-------	1.519	-------	-------	-------	-------	3.490
Mixed bituminous surface	-------	-------	-------	-------	-------	-------	1.827	1.993	1.845	0.972	0.420	1.063	4.038	1.448	2.288
Bituminous penetration	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	1.519				
Bituminous concrete	-------	1.590	-------	-------	1.484	-------	-------	-------	-------	-------	-------	-------	5.731		
Portland cement concrete	0.966	1.912	1.241	0.072	1.821	-------	-------	-------	-------	-------	-------	4.584	-------	-------	0.020
Widening—															
Concrete	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	0.488	-------	0.579
Mixed bituminous	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	1.009
Total	0.966	3.502	2.032	0.072	8.305	1.993	1.827	2.089	1.845	2.491	1.939	5.647	10.257	1.448	7.649
Total, less widening	0.966	3.502	2.032	0.072	8.305	1.993	1.827	2.089	1.845	2.491	1.939	5.647	9.769	1.448	6.061

RL–7m

Miles Retired, Abandoned or Transferred Each Year

Surface type	1928	1929	1930	1931	1932	1933	1934	1935	1936
Gravel or crushed rock	0.981	3.393	2.636	1.763	1.519				
Mixed bituminous surface	-------	-------	-------	-------	-------	4.507	0.298	-------	0.397
Bituminous concrete	-------	-------	-------	-------	-------	-------	1.590		
Portland cement concrete	-------	-------	-------	-------	-------	-------	1.159	0.856	
Total	0.981	3.393	2.636	1.763	1.519	4.507	3.047	0.856	0.397

RL–8m

TABLE NO. 24—*Continued*

Miles Remaining in Service January 1

Surface type	1921	1922	1923	1924	1925	1926	1927	1928	1929
Graded and drained	....	....	....	....	....	....	....	....	....
Gravel or crushed rock	....	....	....	0.791	1.074	6.074	8.765	8.765	7.784
Mixed bituminous surface	....	....	....	....	....	....	....	....	1.197
Bituminous penetration	....	....	....	....	....	....	....	....	....
Bituminous concrete	....	....	1.590	1.590	1.590	1.957	1.957	1.957	1.957
Portland cement concrete	0.500	0.500	2.412	3.653	3.826	6.226	6.226	6.226	6.226
Total	0.500	0.500	4.002	6.034	6.490	14.257	16.948	16.948	17.164

	1930	1931	1932	1933	1934	1935	1936	1937
Graded and drained	....	....	....	....	....	....	....	0.263
Gravel or crushed rock	4.487	2.642	2.398	0.879	0.879	0.879	0.879	4.369
Mixed bituminous surface	4.489	6.334	8.653	9.565	5.168	7.657	8.249	9.779
Bituminous penetration	....	....	....	1.519	1.519	2.770	3.626	3.626
Bituminous concrete	1.957	1.957	1.957	1.957	1.957	6.098	6.098	6.098
Portland cement concrete	6.226	6.226	6.226	6.226	11.762	11.173	10.317	10.390
Total	17.159	17.159	19.234	20.146	21.285	28.577	29.169	34.525

RL–10m

CODING STATISTICAL DATA

Shortly after the loadometer and pit scale field parties began their survey at the various stations throughout the State, an office clerical staff began coding the information which was obtained by the field parties.

Coding entails the process of converting various items such as measurements, descriptive features, dates, geographical divisions, commodities, etc., to a numerical form. The numerical form is set up prior to coding and in such manner that the information desired can be entered on the eighty-column card devised by the International Business Machines Corporation. The equipment of this company was found to be the most practical and economical, after quotations were received from the various tabulating equipment manufacturers.

A coding manual was prepared which contained the key or correlation of this detailed information to a numerical form, for instance, in the column for day of week Sunday was designated by code 1, Monday by code 2, etc.; for road type, primitive road was designated by code 1, graded and drained by code 2, etc. By thus using the codes established in this manual, all the information obtained in the field was converted to numbers on a code sheet under their respective column headings. An enlarged duplicate of the punch card was used to permit the coders to write the number identifying the field information for the various items with the numbers established by the manual.

Practically all the work undertaken by the planning survey department has been or is in the process of being coded; road inventory which classifies over 23,000 miles of road in the State of Nevada into type, width, length, curvatures, sight restrictions, location, system, abutting culture, etc., has been coded and punched on approximately 5,000 cards. In this same manner 1,000 grade crossings, 1,000 structures, origin and destination of 25,034 vehicles and all the information obtained by the pit scale and loadometer parties have been coded, punched and tabulated.

MECHANICAL TABULATION

Early in July of 1937, following the completion of coding on the first phases of the planning survey field work, six machines for mechanical tabulation and punching were leased from the International Business Machines Corporation. This move was made at the suggestion of the Bureau of Public Roads, since the numerous analytical tables which were to be obtained from the field information were readily adaptable to this type of tabulation both from the points of view of saving time and expense and of accuracy.

The machines obtained were as follows:

Two Duplicating Key Punches — The transcription of original numerical data to tabulating cards in the form of punched holes is accomplished by means of an electric punching machine. This machine has a keyboard of 12 recording keys, one for each punching position of a column. As a key is depressed a hole is cut and the card advances automatically to the next column to be punched. The automatic features of the machine and the simplicity of the keyboard make the transcription of coded data into punched-hole form easy, rapid, and efficient.

Two Verifiers—The manual operation of the mechanical verifiers is identical with that of the key punch. The punched card is placed in the verifier and the operator, reading data from the punching source records, proceeds as though actually punching. As each key is depressed a small plunger drops through the hole in the card and permits the card to advance one column. If the key is struck which does not correspond to a hole punched in the card, the carriage of the verifier does not advance, thus calling attention to an error. Comparison of the punched card with the original data is then made immediately to determine what correction may be necessary.

One Sorting Machine—When the punching has been completed, the cards are usually in a miscellaneous order. The next step is to arrange them in sequence by some desired classification—that is to group them according to some information which is punched in them. The electric card-operated sorting machine is used for this purpose.

The operation of the electric card-operated sorting machine is based on the position of the punched hole in a vertical column of the card. As the cards pass through the machine a brush contact is made through the hole causing an electric circuit to be closed. This momentary circuit causes the card to be directed to a receiving pocket which corresponds to the position of the punched hole. For example, a card punched "9" in the column under consideration is directed to the 9 pocket; a card punched "6" in the same column is directed to the 6 pocket, etc.

The automatic sort is made on one column at a time. It is apparent, therefore, that to arrange a group of cards in numerical sequence according to the data punched in a three-column field the group is passed through the sorting machine three times. The sort is made first on the units column, then on the tens column, and finally on the hundreds column. The electric card-operated sorting machine is entirely automatic and operates at a speed of approximately 400 cards a minute.

One Tabulator—The automatic compilation of the punched data into printed reports is accomplished by the electric tabulator which is a combined adding and printing machine. Punched cards passing through this machine actuate the various adding columns and printing mechanisms—again by the means of electrical contacts. Each electric tabulator is so designed that it provides complete flexibility in the arrangement of the compiled and printed data on report form. The machine is entirely automatic and operates at the speed of approximately 150 cards a minute.

Procedure—Upon receiving coded information from the coding department the data were transferred to punch cards by means of duplicating key punch machines. These cards were then checked by the verifier operations. To make doubly sure of apprehending all possible errors, various checks of one field of the card against another field were designed by the tabulating department. These various checks brought to light errors in field records and coding that it was impossible to catch on the verifier.

Although punching the coded information onto the cards was started in July of 1937, it was not until early November of the same year that preparation of the analytical tables required by the Bureau of Public

Roads was begun. By that time 20,549 loadometer cards, 5,970 pit scale cards, and 7,300 motor vehicle allocation cards had been punched. The period from November 1937 to June 30, 1938, was spent in preparing tables from the three above-mentioned types of field information and, in addition, 45,583 origin and destination cards, 4,500 road inventory cards, and 1,000 structure cards were punched and tables were prepared from the information. As of June 30, 1938, it is estimated that 95 percent of the mechanical tabulation has been completed with approximately six weeks more of machine work required for completion of the work. During the first punching operations four operators were employed, one each for the two duplicating key punches and one each for the verifying machines. When preparations of the reports on the sorter and tabulator were commenced in November, one operator was employed for the sorter and one for the tabulator and one person to supervise and plan the work. The additional card punching and verifying from that time on was handled by the two operators.

It is conservatively estimated that each of the punched cards had to pass through two machines, the sorter and tabulator, at least 25 times during the sorting and tabulation procedure in order to insure the correct arrangement of information. Although not all cards of any single type were used for any one table, it was necessary to run all cards through to obtain those which contained the requested information. In all, the total of 936 tables were compiled by the mechanical tabulation method. From the 7,300 motor vehicle allocation cards 612 tables concerning license fees, taxes, population, counties, etc., were prepared.

One hundred and sixty-one tables concerning weights, loads, commodities carried, tire sizes, axle weights, rated capacities, gross weights, carried loads, etc., were prepared from the 5,970 pit scale cards, and in addition 12 tables containing information pertinent to the motor vehicle laws of this State were also compiled.

One hundred and three tables concerning commodity movements, types of commodities, wheel and axle loads, origin and destination, rated capacities, and gross weights were prepared from the 20,549 loadometer cards.

Eight tables dealing with the various origin and destination movements of passenger cars, trucks and busses within this State, interstate and transstate were compiled from the 25,034 origin and destination cards combined with the 20,549 loadometer cards.

Forty tables dealing with road types, surface types, restricted sight distances, surface widths, excessive curves, excessive grades, and types and numbers of structures were compiled from approximately 5,500 road inventory cards.

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